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TENTH ANNUAL REPORT

—OF THE—

INSPECTOR OF MINES,

—OF THE—

STATE OF KENTUCKY,

FOR THE YEAR 1893.

C. J. NORWOOD, Chief Inspector,
W. U. GRIDER, Assistant.

FOR GENERAL DISTRIBUTION.

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LETTER OF TRANSMITTAL.

To his Excellency, JOHN YOUNG BROWN,

Governor of Kentucky:

SIR: I have the honor of submitting the tenth Annual Report of this Department, covering the calendar year 1893.

As your Excellency is aware, I have been delayed somewhat in the preparation of the Report by an injury received by one of my eyes, which wholly incapacitated me for writing for nearly a month, and which has prevented continuous use of my eyes, for such purpose, up to the present time. This fact has also compelled me to forego the completion of certain special matter that was intended for this Report.

In response to numerous requests and suggestions, the chapter entitled "Keys to the Coal Fields," presented in my last Report, is, with some revisions and additions, reprinted. The "Keys," however, need further revision in a few particulars, and it is now possible to definitely decide some questions that were necessarily left in abeyance when the chapter was prepared. It was intended to fully revise and augment that chapter, and to give a general account of the cannels of the State, with maps, and some special notes on the coking coals. Much of the necessary matter has been prepared, but its completion must be deferred.

At my request, Col. M. H. Crump, of Bowling Green, has kindly furnished a list of the coals exhibited at the World's Fair. I had hoped to present a general description of our mineral exhibit, but was unable to secure the necessary data.

To Prof. A. R. Crandall, now of Milton, Wis., I am indebted for a section showing the coals of Bryson Mountain, which has been added to the "Keys." This, with the sections already given in the "Keys," enables one to form a fair notion of that wonderful coal-field lying within Bell county and contiguous regions.

I am particularly indebted to Mr. Charles Hendrie, of Beattyville, Ky., for a very admirable contribution on the cannels of certain portions of the State, which he prepared at my request. This is a valuable paper, the merits of which will be quickly recognized by all who are interested in cannel deposits.

My acknowledgments are due Mr. John B. Atkinson, of Earlington, Ky., for a number of analyses of cokes made by him from the lower coals of the Western Field. The analyses will be used hereafter.

I take pleasure in acknowledging the very helpful aid that has been rendered by Mr. Warner U. Grider, Assistant Inspector. Mr. Grider has performed his duties in an intelligent, faithful and efficient manner, and he merits the highest commendation.

For the consideration with which Your Excellency has treated me, and for the advice respecting official matters which, from time to time, I have sought from you, I beg you will accept my thanks.

With great respect,
I have the honor to be,
Your obdient servant,
C. J. NORWOOD,
State Inspector of Mines.

REPORT.

I.

PRELIMINARY.

In consequence of the change of period to be covered by the Reports of this Department, ordered in the revised mining law (the change providing for a calendar year instead of the one ending June 30th, which had necessarily been adopted), this Report, in statistical matters, covers two years—1892 and 1893.

The change of period was a very desirable one, but the date set for the Report was an error, if not unnecessary. April 1st would have been a more practicable date than February 10th. This is so, because the provisions relating to the Report of the Inspector and those required of the coal operators do not balance. The Inspector is required to report the number of employes, amount of coal mined, etc., during the calendar year, and the date of his Report is set at February 10th; but the operators are allowed until March 1st to send in their last reports for the year, without which the Inspector can not complete his, and many operators avail themselves of all the time allowed. (See section 5 of the mining law.)

ASSISTANT INSPECTOR.

The General Assembly of 1891-93 having provided for the requisite increase of force for this Department—the necessity for which was fully set forth in the Reports for 1890 and 1891—the operations of the past year have, in the main, been quite satisfactory.

It seems well to correct a misunderstanding that exists in some quarters, not only as to the purpose of the Act providing for the appointment of an Assistant Inspector, and as to the author cf the bill, but as to the length of time the Department has had the good of the Assistant's services. The Act was intended solely for the benefit of the miners of the State, was introduced (early in the session of 1891–'93), and was enacted without any reference whatever to any other duties than those relating to the inspection of mines. (See Act providing for Assistant Inspector, approved December 3d, 1892, and Journals of Session of 1891–'93.) The bill was introduced and zealously advocated by Senator F. M. Hutcheson, of Henderson, to whom, more than to any other one person, the credit for its passage is due. In the House the bill was favorably received by the Committee on Mines and Mining, of which the Hon. J. R. Summers was Chairman. There Senator Hutcheson had the assistance of Hon. A. D. James, of Muhlenberg, who, by request, took an active and able part in securing its passage. In this he was materially aided by Hon. John D. Woods, Hon. D. H. Severs, Hon. Posey Ball and others. The present writer can not refrain from feeling that he himself had some part in aiding to secure the enactment of the measure. The duties of the Assistant Inspector are, by the terms of the Act, specifically limited to matters relating solely to the inspection of mines.

As originally enacted, the law would not have taken effect until October, 1893, but by amendment, introduced by Senator Hutcheson, it was put into force June 9, 1893, and the Assistant entered upon his service about July 1st. The Department had the benefit of the Assistant's services, therefore, only during the last half of the year.

CURATOR OF THE GEOLOGICAL DEPARMENT.

At the same session that the legislation intended to secure an efficient supervision of the mines was enacted, an independent measure, very materially increasing the individual labors of the Chief Inspector, was passed, namely, the act making him, in addition to his duties as such Inspector, Curator of the Geological Department. This carries with it, in addition to other duties that are quite distinct from those devolving upon him as Inspector of Mines, the care of a large volume of correspondence, etc., that formerly would not have reached him. The Act went into effect in October, 1893. It may be proper to say that there was no connection whatever between the Act providing for an Assistant Inspector, (approved December 3, 1892), and the one making the Chief Inspector also Curator of the Geological Department; the latter was introduced May 4, 1893, and approved June 20th.

No appropriation was made in the Act providing for the Curatorship, to meet the necessary expenses incurred in keeping up the Cabinet, distributing reports, etc., and for postage; hence, they appear as charges against the Inspector of Mines. A small special fund should have been provided to cover the contingent expenses of the Curator. This matter is mentioned in order that no misunderstanding may arise concerning the expenditures of this Department.

II.

GENERAL CONDITION OF THE MINES, ETC.

It is somewhat difficult to make a general statement that will satisfactorily cover the condition of the mines considered all together. From a review of the inspection notices served during the last two years, however, and of the memoranda made when written notices were not deemed necessary, it appears that in many cases there has been a maintenance of satisfactory conditions; in many more provisional improvements, only, following each inspection and not enduring from one inspection to another, have been the rule; and in a number there has been much temporizing, with also a marked inclination to derive all the advantage possible from the embarrassments which environed this office prior to last July, when the Assistant Inspector entered upon his duties.

There are some mine managers, especially in the Southeastern

District, who have manifested little disposition to keep their mines in good condition simply as a matter of good management and proper regard for the welfare of their employes; they have either procrastinated where they conceded that improvements should be made, or have seemed careless as to all things save the winning of coal. Such men, when attention was called to the unwholesome or unsafe condition of their mines, seem. wherever possible, to have taken advantage of the fact—as it stood prior to last July—that the Inspector might not be able to return to their mines for several months, after making an inspection. Knowing that by the time of his return those portions of the mine last seen by the Inspector would be worked out, or so altered as to make it difficult to secure sufficient evidence to sustain an indictment for a violation of his instructions, they have disregarded such parts of notices as they felt might, under the circumstances, safely be ignored. Such managers need the constant prodding of the law, which, in late years, could not be given, so long as all the duties of this office fell upon one person. Since the appointment of the Assistant, much has been done towards mending these unfavorable conditions, and it is confidently believed that for 1894 a more satisfactory report may be made with respect to them. Hoping to reach such cases as those just mentioned, an inquiry with reference to a proposed special item in future inspection notices was addressed to the Commonwealth's Attorneys whose circuits include most of the Southeastern District. So far only one response has been received (from the Commonwealth's Attorney for Whitley, Pulaski, etc.), but the item has been included in notices since served, and its value will be tested as occasions arise.

Upon the whole, I think it safe to say that, in general, there has been more attention paid to ventilation and drainage within the last year than ever before. But the accident returns still show too many casualties from falls of top. Attention was called to this matter in my Report for 1892, and the suggestion then made is repeated:

"The evidence seems unquestionable that sufficient attention is not paid to the matter of propping, and observation shows that the failure to prop is by no means to be laid entirely to the charge of the 'careless' miner. When the roof along entries, for the condition of which the miner is in nowise responsible, is not kept in good order, but, on the contrary, is allowed to go unscaled or untimbered up to the 'last moment,' long after dangerous conditions have appeared—as has frequently been noted—a looseness of management is indicated which militates against the validity of the explanation, 'carelessness of the miner,' so often given for accidents which have occurred in rooms. The difficulties in the way of enforcing mine rules are not underestimated, but the writer believes that wise rules and more diligent attention to the condition of the roof on the part of the mine officials would materially reduce the percentage of casualties due to falls of top. *A system of examination, by a mine official or special inspector, of the roof in rooms opened in those parts of the mine where 'bad top' has been encountered, before the miners enter in the morning, would certainly give good results.*"

In fact, the only amendment to the mining law now deemed desirable would be one requiring that such examinations, systematically made and the results kept in the form of a daily record, should be provided for.

It may be well to here quote, from a recent issue of the *Mining Bulletin* published by the Pennsylvania State College, some of the remarks suggested by the accident rate of the Pennsylvania mines:

"Some of them (accidents) are due to causes fully and previously recognized by the miners themselves. A little effort or precaution exercised at the moment the danger was realized would have averted many accidents, and it is a singular fact that, year in and year out, fatalities recur in the same mine under precisely similar conditions. Though the men confess that they expect to die 'with their boots on,' there is no need of plunging into untimely risks, not only to themselves, but to their co-laborers. Still, however undesirable all this may be, an undue prominence is not to be given to the carelessness of employes. A grave responsibility rests upon the operators. They must compel obedience to the laws, and they can only effect it by a rigid discipline and an active, efficient supervision. The men appreciate their peril, but only an active management can keep it ever before them. A careful management begets confidence, and the two combined, go a long way to avert disaster. For example, the timbers might be delivered at the working place instead of at the shunt."

"The proportion of deaths from falls of roof and coal to the total deaths from all other causes is increasing everywhere. This follows because of the diminution of casualties from the other causes, by reason of improved ventilation and the increasing rapidity of inspection. * * * A systematic propping of the roof and a sufficiency of timber would contribute to increased safety. The principal causes of 'falls' are summarized as follows, from A. R. Sawyer's 'Accidents in Mines:' '*At the Face*—Slips from insufficiently supporting the roof when starting a longwall drift from pillars; not placing foreset posts as soon as there is room; not posting the top coal; not immediately supporting roof after firing; insufficiently supporting roof while slicing pillars in faulty ground; or with gob on three sides; reeling out of posts while slicing pillars; while drawing timbers; insecure spragging; improper setting of sprags in steep pitches; breaking of overhanging coal by riding on sprags set too far in; resetting sprags without adding others during the operation; passing in front of the coal after having removed sprags; working the coal when only half fallen.'"

"It is the 'moderately good' roof in which the danger lurks. A system of employing special roof inspectors and trained timbermen would promote safety. Very seldom has it been found that the timbers themselves crush, and thus let down the roof. Indeed, in longwall mines, accidents are often traced to the strength of the timbers left standing in the gob, which has the effect of not allowing the roof to subside gradually."

In Ihlseng's "Manual of Mining," attention is called to the fact that, "As to falls of roof, the statistics show that where the roof is notoriously bad, the proportion of accidents from falls is very much less than where it is comparatively good. A rule is urgently needed making it imperative that at the working-face a certain fixed area of roof and length of undercut coal should not be exceeded without proper support."

The fact stated by Prof. Ihlseng is true in the general, the reason being obvious—the danger is more apparent—and there is really less excuse for accidents from falls where the prevailing nature of the roof is well known to be "tender" than where it is apparently safe, but in reality treacherous.

As may readily be supposed, from what has gone before, the larger number of fatalities from falls of top have occurred in the Southeastern District. Of the total fatalities from that cause within the last two years (13), more than 76 per cent. occurred in Whitley county, in the Southeastern District.

The Western District has, in all respects, the best record. More care is taken in the matter of propping, notwithstanding that there is a more "reasonably safe" slate over the coals usually worked there than in the other Districts; and a greater regard is had for the ventilative and drainage conditions of the mines. It may also be remarked that in that District there is a more general tendency towards prompt compliance with the requirements of the inspection notices.

The Northeastern District, though still subject to criticism on the score of ventilation in most instances, has greatly improved within the last two years, and has stood next to the Western one in the limitations of inside fatalities.

A comparison of the accident and fatality rates of 1892 and 1893 with those for 1891 is encouraging. There was a large increase in the number of tons of product raised per death, and the ratio of serious casualties to the number of persons employed was much less.

CALENDAR YEAR 1892.

Following are brief statistics for the calendar year 1892:

FATALITIES FOR 1892.

DISTRICT.	Inside.	Out.	Total.
Western	2	1	3
Southeastern	3	......	3
Northeastern	......	2	2
Totals	5	3	8

Maximum persons employed	9,491
Maximum persons inside	7,636
Total tons of product	3,027,298
Tons raised per inside death	605,459
Tons raised per death—in and out	378,412
Maximum persons inside per inside death	1,527
Maximum persons employed per deaths in and out	1,186
Percentage of deaths from falls of top	80.

CALENDAR YEAR 1893.

A series of closely recurring fatalities in the first months of 1893 (four of them occuring in January) materially lowered the tonnage of coal raised per death, as compared with the record for 1892. Compared with that for 1891, however, the amount was greater by 73,271 tons. Seven of the deaths occurred before the Assistant Inspector had entered upon his duties (which was in July), and nine of the total of twelve fatalities occurred in the Southeastern District.

The following table shows the distribution of the fatalities by Districts :

DISTRICTS.	Inside.	Out.	Totals.
Western	1	......	1
Southeastern	8	1	9
Northeastern	2	......	2
Totals	11	1	12

Maximum persons employed	11,277
Maximum persons inside	9,278
Tons of product raised	3,302,250
Tons raised per inside death	300,204
Tons raised per death—in and out	275,187
Maximum persons inside per inside death	848
Maximum persons employed per death—in and out	939
Percentage of inside deaths from falls of top	81 81

FATALITY RATES BY YEARS.

YEAR.	Tons of Product Raised. . . .	Fatalities Inside .	Tons Raised Per Inside Fatality.	Maximum Persons Inside Per Inside Death . . .
1888	2,384,893	14	170,342	. . . .
1889	2,246,259	12	187,188	. . . .
1890	2,532,526	9	281,391	. . . .
1891	2,950,136	13	226,933	540
1892	3,027,298	5	605,459	1,527
1893	3,302,250	11	300,204	843

IMPROVEMENTS.

Noteworthy improvements, or additions to equipment, which are stated in detail elsewhere, have been made at the following mines during the year 1893: Aberdeen, Baskett, Central, Corydon, Coöperative, Crabtree, Cumberland, Davidson's, DeKoven, Earlington (St. Bernard Co.'s), Echols, Falcon, Mud River, Powderly, Reinecke, Render, St. Charles, and Taylor, in the Western District; Alpine, Barren Fork, Breckenridge and Pineville, Central Appalachian, Central Jellico, Dowlais, Kensee, Laurel, North Jellico, Pitman, Procter, Union, and Victoria, in the Southeastern District; Great Western Mining and Manufacturing Company's (Peach Orchard), Kentucky Cannel, Lost Creek, and Strait Creek, in the Northeastern District.

INSPECTIONS MADE.

As stated elsewhere, although the Act providing for the appointment of an Assistant Inspector was finally passed in November, 1892, and was approved on December 3d, it did not become effective until June, 1893, and the Assistant did not enter upon his duties until July. A short time was required for the Assistant to acquaint himself with the disposition of the mines, and a part of his time was occupied in aiding to bring up the office work, which, for reasons given in a preceding Report, was very much in arrears.

Under such circumstances, bearing in mind that the mines are scattered through three widely separated sections of the State, and that additional duties, relating to a distinct Department, were, by Legislative enactment, placed upon the Chief Inspector about the time the Assistant began his service, the record made by this office for the last year is a gratifying one. More field-work was accomplished than had been deemed probable for 1893, thus giving ample assurance of the fulfillment of all requirements made of this Office by the mining laws.

Following are summaries of the number of inspections made since my last report:

Summaries.

1. Inspections from October 1, 1892, to December 31, 1893:

By the Chief Inspector	89
By the Assistant Inspector	77
Total	166

2. Inspections during the calendar year 1893:

By the Chief Inspector	79
By the Assistant Inspector	77
Total	156

3. Inspections from July 1, 1893, to December 31, 1893:

In Western Field	76
In Eastern Field	53
Total	129

4. Inspections according to fields by the Chief and Assistant for calendar year 1893:

	WESTERN FIELD.		EASTERN FIELD.		Total.
	First Half Year.	Second Half Year	First Half Year.	Second Half Year.	
Chief Inspector.	11	26	16	26	79
Assistant Inspector	...	50	....	27	77
Totals	11	76	16	53	156

Total in Western Field in 1893	87
Total in Eastern Field in 1893	69
Total	156

Summaries of the details of the Inspection Notices served since October 1, 1892, are given elsewhere.

MISCELLANEOUS.

Maps.—Under the operation of the revised mining law—which requires maps to be sent to this Office once instead of twice a year—less difficulty has been experienced in securing mine maps than formerly; but the certificate relating to the correctness of the map, required by section 8, has been omitted from a number of the maps that have been received up to this writing. Such certificates will be required for each map sent, and it will be well for operators to examine the section of the law referred to.

Poor Oil.—Attention is again called to the growing use of poor oil in the mines. However well ventilated a mine may be in the direction of supply of air and provisions for conducting it, the use of poor oil vitiates the atmosphere of the rooms and injures the health of the miners. Unless the operators themselves remedy the evil by ceasing to purchase the highly adulterated illuminants, a law requiring the use of good oil only should be enacted, as has been done in some other States.

Firing at any time.—This practice still obtains at some of the mines, and it has been noted in some places where the ventilating arrangements were very defective. Protests against the practice have been met, at some mines, by the response that the "company does not approve it, but the men want it, and we can't stop it." Such response under any circumstances is puerile, and it is especially groundless when section 11 of the mining law is taken into consideration. When blasts are fired indiscriminately throughout the day, the workings are kept filled with the resulting noxious gases, and the best efforts at ventilation are rendered well nigh, if not altogether, ineffective. Shooting twice a day is often enough at any mine supplied with a good crew of competent miners.

MINING BY MACHINE.

Within the last year a number of inquiries have been received concerning the use of mining machines in this State.

The following statement, prepared in response to an inquiry received from F. J. V. Skiff, Chief of the Department of Mines and Mining, World's Fair, in October last, may be of some interest:

1. There are 70 machines now (October, 1893) used in this State, distributed among 7 companies. As to makes, they are distributed as follows:

Harrison machine	43.	Power used, Air.
Ingersoll-Sergeant machine	10.	Power used, Air.
Jeffrey machine	9.	Power used, Air.
Sperry machine	8.	Power used, Electricity.
Total	70	

2. About 20¼ per cent. of the total product of bituminous coal is mined by machine. But in only one mine are machines used exclusively.*

3. It is not practicable to determine "what plants or districts have produced the best results with machines," etc., because: 1, The coals wrought by the different companies are not identical with each other, except in three instances, and in those the circumstances are not favorable for making comparisons. 2, The thicknesses of the beds are not uniform. 3, The coals are not uniform as to hardness, freedom from "sulphur" bands, and as to texture; and the under-clays differ from each other materially.

Three out of the ten Ingersoll-Sergeant machines are used alongside of Harrison machines, by two companies, no difference in each case being made as to handling. The results from the two makes are in each case equal. The remaining seven (distributed between two companies) have not been worked under conditions that warrant comparisons to be made between them and the other machines.

The Sperry electric machine, used at one place, has been worked under very unfavorable conditions, and comparisons can not properly be made between results obtained from it and those from other machines.

Nearly all the Jeffrey machines (8 out of the 9) are used at one mine, where the conditions under which they are used again preclude the institution of satisfactory comparisons.

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* Recently, I believe, another mine, in which a number of diggers were employed in addition to machines, has been converted into an exclusively machine mine.

The number of lineal feet cut per day of 10 hours, depth of undercut being uniform, ranges as follows:

Harrison and Sergeant machines, in hard coal	50 to 55
Sergeant machine, in softer coal	45 to 60
Jeffrey machine, in medium hard coal	50 to 65
Sperry machine, in hard coal (average)	50

I have not the requisite data to determine the number of feet cut per horse-power, hence a very important element is lacking in making comparisons between the machines in Kentucky mines.

All things considered, the following general statement may be made as to results obtained in the mines of this State.

Harrison and Ingersoll-Sergeant Machine.—In the experience of those who have used these machines alongside each other, in this State, they are equal,* and (the Sperry electric being left out of consideration, because of reasons hitherto given), they seem to produce the best results in the hard coals, and where "sulphur" bands occur.

The Jeffrey Machine.—In the soft coals, and where there is no difficulty with pyrites, the Jeffrey seems to equal, if not exceed, the preceding in the number of lineal feet cut per unit of 10 hours; but the percentages of difference in favor of machine-mined as compared with hand-mined product, (in cheapness and proportion of lump secured), are less marked than in the case of the preceding; this, however, I am inclined to think is apparent rather than real, being dependent rather upon difference between circumstances than between machines, so far as present experience in this State shows.

The machines are distributed between the two coal-fields as follows:

Western Field:

Harrison machines	20
Ingersoll-Sergeant machines	6
Jeffrey machines	8
Sperry electric machine	8
Total	42

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* Opinions as to ease of handling, etc., differ among machine runners. In some respects the Ingersoll-Sergeant has advantages in that direction.

Eastern Field:

Harrison machines	23
Ingersoll-Sergeant machines	4
Jeffrey machines	1
Total	28

It should be stated that in the foregoing several questions, relating to economy, etc., were left untouched, because they could not well be discussed without disclosing confidential information concerning individual mines, the number of companies using machines being so limited. Since the statement was prepared the Ohio Valley Coal and Mining Company, at DeKoven, has placed five Ingersoll Sergeant machines in its No. 9 Slope.

III.

STATISTICAL INFORMATION.

According to production in 1893, Kentucky stands ninth among the States and Territories producing coal. Its output fell less than 200,000 tons behind that of Indiana and Virginia, respectively.

The rate at which the Commonwealth has advanced as a mining State within recent years is shown by the following statement of the output (bituminous and cannel) for the years indicated:

In 1878 the million tons mark was first reached, the output being 1,008,000 tons.

In 1888 the two million tons mark was first reached, the output being 2,384,893 tons.

In 1892 the three million mark was reached, the output being 3,027,298 tons.

In 1893 the output was 3,302,250 tons. In this year the output of bituminous coal alone first reached the three million mark, the output in tons being 3,258,712.

According to production in 1893, the counties producing 100,000 tons and over rank as follows: Hopkins, Whitley, Ohio, Muhlenberg, Laurel, Knox, Boyd, Carter, Union, Henderson and Pulaski.

Hopkins is far in the lead among the mining counties. Its output for 1893 was double that for the entire Northeastern District, and it lacked only about 280,000 tons of equaling that for the entire Southeastern District. It is worthy of note that the output of one company alone in this county (the St. Bernard, with four mines), greatly exceeds the total output of either Ohio or Muhlenberg county, and that it exceeds by nearly 8,000 tons the total output of Whitley county.

It is believed that within the present year Morgan, and possibly Pike, Floyd and Martin, will enter the list of counties producing commercial coal.

As has been stated hitherto, the output of the commercial mines, only, (i. e., shipping mines and the few that locally compete with them), is reported by this Office. Experience has shown that it is impossible, under present conditions, to obtain returns from the small "country" and "family" banks, there being no law under which such returns may be required; hence, especially since the aggregate output of such mines is small, it is deemed best to confine our statistics to the limits within which accurate results may be obtained.

The result of the tabulation of the output returns for the calendar year 1893 was a surprise. No material increase in the production over that for 1892 was expected; a decrement was, in fact, deemed more probable. The returns, however, show an increase of 274,952 net tons in the output of coal (bituminous and cannel), and an increment of 9,287 in the tonnage of coke made.

An interesting feature of the business for the past year appears in the shipments from the Kentucky mines to Louisville. They amounted to 622,046 net tons against 422,651 tons in 1892, and 438,672 tons in 1891.

In view of the increase of production, it is somewhat surprising to find that the tonnage of coal shipped to points outside the State in 1893 was less than in 1892. This may have been due rather to a displacement or replacement of "foreign" coal in some of the home markets, than to a material increase in the general consumption of coal within the State. It might seem that a considerable part of the difference between the increased production and decreased outward shipments could be accounted for in the increase of shipments to Louisville, but it can not be done. While some mines in certain counties from which coal is shipped to other States increased their shipments to Louisville, the gain in that direction was not equal to the loss in the outward shipments from those counties.

The output of bituminous coal alone was 81,467,800 bushels (of 80 pounds,) an increase of 7,131,410 bushels. The increment is all attributable to an increase of production in the Western and Southeastern Districts—chiefly in the latter; and a considerable part of the gain of 1893 over 1892 in the latter District goes to cover a decrement in the production of that District for 1892, as compared with that for 1891. There was a loss of nearly 360,000 bushels in the production of the Northeastern District for 1893, as compared with that for 1892. The output of that District has been declining with each year since 1890, the total decrement for the three years since 1890 being 1,480,789 bushels.

GAINS AND LOSSES FOR 1892 AND 1893.

Following is a statement of the gains and losses in the production of bituminous coal for the years 1892 and 1893, stated in bushels:*

WESTERN DISTRIBT—1892.	All Mines.	Shipping Mines.
Output for 1892	43,029,993	42,039,776
Output for 1891	39 786,253	38,750,670
Gain for 1892	3,243,740	3,289,106

WESTERN DISTRICT—1893.	All Mines.	Shipping Mines.
Output for 1893	44,889,672	44,121,776
Output for 1892	43,029,993	42,039,776
Gain for 1893	1,859,679	2,081,849

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* It may be well to state that the "legal" bushel in Kentucky weighs 76 pounds. In the Reports of this Office however, the bushel of 80 pounds is used, that being the one commonly used at the mines.

GAINS AND LOSSES FOR 1892 AND 1893—Continued.

SOUTHEASTERN DISTRICT—1892.	All Mines.	Shipping Mines.
Output in 1891	21,781,725	21,751,725
Output in 1892	20,990,947	20,930,947
Loss for 1892	790,778	820,778

SOUTHEASTERN DISTRICT—1893.	All Mines.	Shipping Mines.
Output for 1893	26,628,171	26,578,171
Output for 1892	20,990,947	20,930,947
Gain for 1893	5,622,224	5,647,224

NORTHEASTERN DISTRICT—1892.	All Mines.	Shipping Mines.
Output for 1891	11,109,448	11,109,443
Output for 1892	10,315,450	10,814,450
Loss for 1892	798,993	794,998

NORTHEASTERN DISTRICT—1893.	All Mines.	Shipping Mines.
Output for 1892	10,815,450	10,814,450
Output for 1893	9,954,957	9,954,957
Loss for 1893	860,498	859,493

The tables show net gains for the shipping mines in each of the years 1892 and 1893 thus:

Net gain for 1892	1,673,335 bushels.
Net gain for 1893	7,369,100 bushels.

It will be noted in the tables that the gain for 1892 was all due to gains in the Western District.

PERCENTAGE OF LUMP.

Of the total output of commercial bituminous coal (74,336,390 bushels) by 117 mines in 1892, 73,285,173 bushels were produced by 100 shipping mines. Of this, 39.5 per cent. was lump coal. The percentages of lump to total production in the three Inspection Districts were as follows:

Western	Total lump	16,681,996.	Equals 39.6 per cent.
Southeastern	Total lump	7,214,956.	Equals 34.4 per cent.
Northeastern	Total lump	5,121,290	Equals 49.6 per cent.

Of the total output for 1893 (81,467,800 bushels of commercial bituminous), 80,654,253 bushels were produced by 107 shipping mines. Of this, 37.4 per cent. was lump coal. The percentages of lump to total production in the three Districts were as follows:

Western	Total lump	16,956,043.	Equals 38.4 per cent.
Southeastern	Total lump	8,256,819.	Equals 31.0 per cent.
Northeastern	Total lump	5,001,102.	Equals 50.2 per cent.

SELLING VALUE OF COAL.

According to the returns made to this Office for 1893, there was a slight advance (.0067 of a cent per ton) in the selling value of the bituminous coal, at the mines, over 1892.* An increase of .0061 of a cent per ton is indicated for the shipping mines, considered alone. This is attributable to an average increase of .747 cents reported from the Northeastern District, and of .0065 of a cent reported from the Southeastern one. It is quite possible that the reported increase is somewhat too high, since it is questionable whether reports from some of the mines were based upon as accurate computations as should have been made. (This is a matter to which I would be glad to have the operators give more careful consideration, when making up their annual statements for this Office, than, in some cases, has been done. The effort of the Office to furnish statistics as to the average selling value of the coal is one in which they will find themselves more and more interested as the development of mining proceeds. The information is of a sort that will prove useful in several directions. As is stated in all requests for the necessary data, the individual returns are kept strictly confidential, hence there is no opportunity for competitors to learn, through this Office, what prices are obtained by each other.)

Compared with the selling value for 1891, there was a falling off for 1893, but the exact amount can not be given, since returns for that year were for the one ending June 30th.

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*In the Reports of this Office the term "bituminous" is used in its generally accepted sense, and does not include cannel, which is reported separately, except in the general summaries.

CONSUMPTION OF POWDER.

Following is a statement of the consumption of powder, in kegs of twenty-five pounds, at the mines for the calendar years 1892 and 1893. There has been no material change in the average cost since the last Report. The average price per keg at the bituminous mines for the year ending June 30, 1892, was $2.642. The prevailing prices were: In the Western District, $3; Southeastern, $2.50; Northeastern, $2 and $2.25:

District.	Number of Kegs.	
	Calendar Year 1892.	Calendar Year 1893.
Western	29,279	30,193
Southeastern.	9,972	15,697
Northeastern	5,469	5,360
Totals.	44,720	51,250

TIME WORKED AND EMPLOYES.

There was little difference between the years 1892 and 1893 in the average time worked at the mines, the average number of days worked in the former year being 175, and in the latter 161. But there was a considerable increase in the number of employes. The maximum number of persons employed in 1892 was 9,491; the average number was 7,668. In 1893 the maximum number was 11,277, and the average number 8,539.

Following are detailed statistics relating to output, employes, etc., for the calendar years 1892 and 1893:

CORRECTION.

Page 20, under the heading, "SELLING VALUE OF COAL." In 2d line for 067 of a *cent*," read .0067 of a *dollar*; i. e., 6.7 mills.

In 4th line for ".0061 of a *cent*," read .0061 of a *dollar*; i. e., 6.1 mills.

In 7th line for ".0065 of a *cent*," read .0065 of a *dollar*; i. e., 6.5 mills.

DETAILED STATISTICS FOR 1892.

The consolidated bituminous output of all Districts for the calendar year 1892 was as follows:

CALENDER YEAR 1892.

OUTPUT IN BUSHELS OF 80 POUNDS.

[BITUMINOUS.]

GRADE.	From 100 Shipping Mines.	From 17 Non-Shipping Mines.	Total from 117 Mines.
Lump	29,018,242	437,864	29,456,106
Nut	8,119 816	125,900	8,245,215
Mixed Lump and Nut	12,037,620	166,500	12,204,120
Run of Mines	13,078,705	205,861	13,284,566
Pea	1,934,764	39,037	1,973,801
Slack	5.793,016	75,265	5.868,281
Miscellaneous	3,303,511	790	3,304,301
Totals	73,285,173	1,051,217	74,336,390

The number of employes was as follows:

	FOR 100 SHIPPING MINES.			FOR 17 NON-SHIPPING MINES.			TOTALS FOR 117 MINES.		
	In.	Out.	Total.	In.	Out.	Total.	In.	Out.	Total.
Maximum	7,129	1,701	8,830	126	40	166	7,255	1,741	8,996
Average	5,938	1,341	7,279	91	30	121	6,029	1,371	7,400

[For total employes in both bituminous and cannel mines, see summary for those mines on a succeeding page.]

The output of Bituminous Coal by Districts, in bushels, was as follows:

WESTERN DISTRICT.

CALENDAR YEAR, 1892.

[BITUMINOUS.]

GRADE.	From 48 Shipping Mines.	From 15 Non-Shipping Mines.	Total From 63 Mines.
Lump	16,681,996	437,864	17,119,860
Nut	4,743,914	125,900	4,869,814
Mixed Lump and Nut . . .	8,447,294	135,500	8,582,794
Run of Mines.	5,997,822	175,861	6,173,183
Pea	931,872	39,037	970,909
Slack.	3,440,240	75,265	3,515,505
Miscellaneous	1,797,138	790	1,797,928
Totals	42,039,776	990,217	43,029,993

The output of this District exceeded the amount reported for 1891 by 3,243,740 bushels. The increase for the shipping mines amounted to 3,289,106 bushels.

The number of employes was as follows:

	FOR 48 SHIPPING MINES.			FOR 15 NON-SHIPPING MINES.			TOTAL FOR 63 MINES.		
	In.	Out.	Total.	In.	Out.	Total.	In.	Out.	Total.
Maximum	3,360	912	4,272	117	39	156	3,477	951	4,428
Average	2,853	786	3,589	85	29	114	2,938	765	3,703

SOUTHEASTERN DISTRICT.

CALENDAR YEAR 1892.

[BITUMINOUS]

GRADE.	For 36 Shipping Mines.	For 1 Non-shipping Mine.	Totals for 37 Mines.
Lump	7,214,956	. . . .	7,214,956
Nut	2,346,766	. . . .	2,346,766
Mixed lump and nut . .	3,166,337	30,000	3,196,337
Run of Mines	4,690,750	30,000	4,720,750
Pea	710,500	. . . .	710,500
Slack	1,515,248	. . . .	1,515,248
Miscellaneous	1,286,390	. . . .	1,286,390
Totals	20,930,947	60,000	20,990,947

The output of this District was less than that reported for 1891 by 790,778 bushels. The decrement for the shipping mines amounted to 760,778 bushels.

The number of employes was as follows:

	FOR 36 SHIPPING MINES.			FOR 1 NON-SHIPPING MINE.			TOTAL FOR 37 MINES.		
	In.	Out.	Total.	In.	Out.	Total	In.	Out.	Total
Maximum	2,549	530	3 079	6	1	7	2,255	531	3,086
Average	2,054	395	2,449	4	1	5	2,058	396	2,454

NORTHEASTERN DISTRICT.

CALENDAR YEAR 1892.

[BITUMINOUS.]

GRADE.	From 17 Mines.*
Lump	5,121,290
Nut	1,028,635
Mixed lump and nut	424,989
Run of mines	2,390,633
Pea	292,392
Slack	837,528
Miscellaneous	219,983
Total	10,315,450

* All shipping save one, which produced 1,000 bushels mixed lump and nut.

The output of this District for 1892 was less than for 1891 by 793,993 bushels.

The number of employes was as follows:

	Inside.	Outside.	Total for 17 Mines.
Maximum	1,223	259	1,482
Average	1,033	210	1,243

BITUMINOUS MINES.

OUTPUT OF SHIPPING MINES ON RAILROADS.

CALENDAR YEAR 1892.

DISTRICT.	County.	Number of Mines.	Railroad.	Total Bushels.
Western	Christian	1	Henderson & Nashville Division of L. & N.	819,221
"	Daveiss	1	Louisville, St. Louis & Texas.	145,915
"	Hancock.	1	Louisville, St. Louis & Texas	65,775
"	Henderson	2	Louisville, St. Louis & Texas.	2,433,398
"	Hopkins	8	Henderson & Nashville Division of L. & N.	11,623,828
"	"	1	Providence Branch of H. & N. Div. of L. & N.	2,583,870
"	"	2	Chesapeake, Ohio & Southwestern	4,211,456
"	McLean	1	Owensboro & Russellville Division of L. & N.	272,890
"	Muhlenberg	4	Chesapeake, Ohio & Southwestern	4,009,621
"	"	3	Owensboro & Russellville Division of L. & N.	3.407,414
"	Ohio	5	Chesapeake, Ohio & Southwestern	7,548,219
"	"	4	Owensboro, Falls of Rough & Green River	706,422
"	Union	7	Ohio Valley	2,405,131
"	Webster	2	Providence Branch of H. & N. Div. of L. N.	926,944
	Totals	42		41,155,099
Southeastern	Bell	8	Cumberland Valley Division of L. & N.	406 466
"	Knox	1	Cumberland Valley Division of L. & N.	2,649,501
"	Laurel	18	Knoxville Branch of L. & N.	6,276,717
"	Pulaski	4	Cincinnati Southern.	1,950,599
"	Rockcastle	1	Knoxville Branch of L. & N.	280 879
"	Whitley	10	Knoxville Branch of L. & N.	9,866,784
	Totals	87		20,980,946

Northeastern	Boyd	2	Newport News & Mississippi Valley, E. D.	4,068,916
"	Breathitt	1	Kentucky Union	827,228
"	Carter	2	Eastern Kentucky Railway	477,186
		8	Newport News & Mississippi Valley, E. D.	3,226,774
"	Lawrence	3	Ohio & Big Sandy	2,118,851
"	Menefee	1	Kentucky & South Atlantic	106,500
	Totals	17		10,315,450

SUMMARY.

DISTRICTS.	Number of Mines.	Total Product in Bushels.
Western	42	41,155,099
Southeastern	37	20,930,946
Northeastern	17	10,315,450
Totals	96	72,401,495

BITUMINOUS AND CANNEL MINES.

NUMBER OF EMPLOYES AND DAYS WORKED.

CALENDAR YEAR 1892.

(County totals include boys.)

COUNTY.	Number of Distinct Operations	Number of Banks or Mines	EMPLOYES.						Boys Underground.	Number of days Worked . . . . .
			Maximum.			Average.				
			In.	Out.	Total.	In.	Out.	Total.		
Butler	1	1	45	11	57	43	10	54	1	196
Christian	1	1	125	15	142	93	14	109	2	184
Crittenden	2	2	13	2	15	11	2	13	. . . .	246
Daveiss	9	9	68	9	77	58	9	67	. . . .	1,095
Hancock	4	4	116	34	156	104	33	143	6	553
Henderson	5	5	260	63	338	212	53	280	15	1,153
Hopkins *	10	11	1,230	402	1,702	1,049	337	1,456	70	1,961
McLean	2	2	22	5	27	17	5	22	. . . .	341
Muhlenberg	8	8	613	129	779	522	108	662	37	1,605
Ohio	9	9	647	122	805	547	107	690	36	1,668
Union	5	6	171	176	353	135	111	252	6	910
Webster	1	2	70	8	83	50	6	61	5	200
Western District.	57	60	3,380	976	4,534	2,841	790	3,809	178	10,112*
Bell	2	8	85	32	118	51	28	75	1	125
Clay	1	1	6	1	7	4	1	5	. . . .	. . . .
Knox	1	1	249	60	324	178	29	217	15	185
Laurel	12	17	816	152	1,010	689	114	845	42	1,914

Pulaski	3	4	198	76	285	166	59	236	11	515
Rockcastle	1	1	100	10	112	86	8	96	2	96
Whitley	6	8	962	200	1,280	750	162	980	68	1,091
Southeastern District	26	35	2,416	531	3,086	1,919	396	2,454	139	3,926†
Boyd	2	2	335	38	387	299	26	339	14	475
Breathitt	1	1	50	10	60	50	10	60	. . . .	230
Carter	10	11	434	98	575	331	88	462	43	1,938
Greenup	1	1	25	. . . .	25	25	. . . .	25	. . . .	?
Johnson	2	2	301	78	382	128	30	156	3	602
Lawrence	2	3	304	106	416	256	80	342	6	420
Magoffin	1	1	6	1	7	5	1	6	. . . .	?
Menefee	2	2	12	7	19	9	6	15	. . . .	220
Northeastern District	21	23	1,467	338	1,871	1,098	241	1,405	66	3,885‡

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* Days for 57 distinct operations.

† Days for 25 distinct operations.

‡ Days for 19 distinct operations.

SUMMARY FOR EMPLOYES AND DAYS.

DISTRICT.	Number of Distinct Operations	Number of Mines	Employes. Maximum. Diggers, &c.	Employes. Maximum. Out	Employes. Maximum. Average Boys	Employes. Average. Diggers, &c.	Employes. Average. Outside	Employes. Average. Average Boys	Totals. Maximum	Totals. Average	Total Days Worked
Western	57	60	3,380	976	178	2,841	790	178	4,584	3,809	10,112[*]
Southeastern	26	35	2,416	531	139	1,919	396	139	3,086	2,454	3,926[†]
Northeastern	21	23	1,467	338	66	1,098	241	66	1,871	1,405	3,885[‡]
Totals	104	118	7,263	1,845	383	5,858	1,427	383	9,491	7,668	17,923[§]

[*] For 57 distinct operations. [†] For 25 distinct operations. [‡] For 19 distinct operations. [§] Days for 101 distinct operations.

The average number of days worked during the year for the State was 175.7. The average number for each District was as follows:

Western District	177.4 days.
Southeastern District	157 days.
Northeastern District	204.5 days.

DETAILED STATISTICS FOR 1893.

The consolidated bituminous output of all districts for the calendar year 1893, was as follows:

CALENDAR YEAR 1993.

OUTPUT IN BUSHELS OF 80 POUNDS.

[BITUMINOUS].

GRADE.	From 107 Shipping Mines.	From 6 Non-Shipping Mines.	Total from 113 Mines.
Lump	30,213,964	365,690	30,579,654
Nut	9,343,674	123,420	9,467,094
Mixed Lump and Nut .	12,115,339	. . . .	12,115,339
Run of Mines.	15,571,724	191,115	15,762,839
Pea	2,452,080	46,200	2,498,280
Slack	6,311,085	80,308	6,391,393
Miscellaneous	4,646 384	6,817	4,653,201
Totals	80 654 253	813 547	81,467,300

The number of employes was as follows:

	FOR 107 SHIPPING MINES.			FOR 6 NON-SHIPPING MINES.			TOTALS FOR 113 MINES.		
	In.	Out.	Total.	In.	Out.	Total.	In.	Out.	Totals.
Maximum . .	8,735	1,829	10,564	80	26	106	8,815	1,855	10,670
Average . . .	6,682	1,302	7,984	60	22	82	6,742	1,324	8,066

[For total employes in both bituminous and cannel mines see summary for those mines on a succeeding page.]

The output of bituminous coal, in bushels, by districts, was as follows:

WESTERN DISTRICT.

CALENDAR YEAR 1893.

[BITUMINOUS.]

GRADE.	From 47 Shipping Mines.	From 5 Non-Shipping Mines.	Total from 52 Mines.
Lump	16,956,048	865,690	17,821,738
Nut	5,019,387	123,420	5,142,807
Mixed Lump and Nut .	8,840,540	. . . .	8,840,540
Run of Mines	5,141,148	146,115	5 287,263
Pea	980,487	46,200	1,026 687
Slack	3,663,877	80,308	3,744,185
Miscellaneous	3,519,640	6,817	3,526,457
Totals	44,121,125	768,547	44,889,672

The output for this District for 1893 was greater than that for 1892 by 1,859,679 bushels. The increase for shipping mines amounted to 2,081,349 bushels.

The number of employes was as follows:

	FOR 47 SHIPPING MINES.			FOR 5 NON-SHIPPING MINES.			TOTALS FOR 52 MINES.		
	In.	Out.	Total.	In.	Out.	Total.	In.	Out.	Total.
Maximum	3,860	892	4,752	80	26	106	3,940	918	4,858
Average	3,031	700	3,731	60	22	82	3,091	722	3,813

SOUTHEASTERN DISTRICT.

CALENDAR YEAR 1893.

[BITUMINOUS.]

GRADES	From 43 Mines.*
Lump	8,256,819
Nut	8,138,885
Mixed Lump and Nut	3,235,507
Run of Mines*	8,150,390
Pea	1,184,710
Slack	1,664,399
Miscellaneous	992,961
Total	26,623,171

* Includes 1 non-shipping mine, which produced 45,000 bushels run of mines.

The output of this District for 1893 was greater than that for 1892 by 5,632,224 bushels.

The number of employes was as follows:

	FOR 43 MINES.		
	In.	Out.	Total.
Maximum*	3,548	672	4;220
Average†	2,681	444	3,125

*One non-shipper equals 6 in and 1 out. †One non-shipper equals 3 in and 1 out.

NORTHEASTERN DISTRICT.

CALENDAR YEAR 1893.

[BITUMINOUS.]

GRADES.	For 18 Shipping Mines.
Lump	5,001,102
Nut	1,185,902
Mixed Lump and Nut	39,292
Run of Mines	2,325,186
Pea	286,888
Slack	982,809
Miscellaneous	133,788
Total	9,954,957

The output for this District for 1893 was less than that for 1892 by 460,493 bushels.

The number of employes was as follows:

	FOR 18 MINES.		
	In.	Out.	Total.
Maximum	1,321	264	1,585
Average	970	158	1,128

BITUMINOUS MINES.

OUTPUT OF SHIPPING MINES ON RAILROADS.

CALENDAR YEAR 1898.

DISTRICT.	County.	Number of Mines	Railroad.	Bushels of Product.
Western	Christian	1	Henderson & Nashville Division of L. & N.	891,785
"	Daveiss	1	Louisville, St. Louis & Texas	187,605
"	Hancock	2	Louisville, St. Louis & Texas	472,457
"	Henderson	2	Louisville, St. Louis & Texas	1,714,878
"	Hopkins	9	Henderson & Nashville Division of L. & N.	14,501,017
"	"	3	Chesapeake, Ohio & Southwestern	4,525,846
"	McLean	1	Owensboro & Russellville Division of L. & N.	55,985
"	Muhlenborg	4	Chesapeake, Ohio & Southwestern	5,109,384
"	"	3	Owensboro & Russellville Division of L. & N.	2,716,764
"	Ohio	6	Chesapeake, Ohio & Southwestern	8,628,139
"	"	2	Owensboro & Falls of Rough	238,618
"	Union	6	Ohio Valley	2,904,117
"	Webster	2	Providence Branch of H & N. Div. (L. & N.)	898,482
	Totals	42		42,840,027
Southeastern . . .	Bell	6	Cumberland Valley Branch of L. & N.	1,526,296
"	Knox	1	Cumberland Valley Branch of L. & N.	4,007,144
"	Laurel	16	Knoxville Branch of L. & N.	7,149,558
"	Pulaski	4	Cincinnati Southern	2,274,765
"	Rockcastle	1	Knoxville Branch of L & N.	225,131
"	Whitley	14	Knexville Branch of L. & N.	11,395,277
	Totals	42		26,578,171

BITUMINOUS MINES—Continued.

District.	County.	Number of Mines.	Railroad.	Bushels of Product.
Northeastern	Boyd	2	Newport News & Mississippi Valley E. D.	3,832,838
"	Breathitt	1	Kentucky Union	195,789
"	Carter	1	Eastern Kentucky Railway	345,650
		7	Newport News & Mississippi Valley E. D.	2,884,856
"	Lawrence	3	Ohio & Big Sandy	2,822,289
"	Lee	3	Beattyville & Cumberland Gap.	421,255
	Totals	17		9,954,957

SUMMARY.

District.	Number of Mines.	Product in Bushels.
Western	42	42,840,027
Southeastern	42	26,578,171
Northeastern.	17	9,954,957
Totals.	101	79,373,155

SUMMARIES OF OUTPUT OF BITUMINOUS SHIPPING AND NON-SHIPPING MINES FOR THE YEARS 1891 1892 AND 1893.

In the following summaries of the output of shipping and non-shipping bituminous mines, statistics for 1891 are given for purposes of comparison.

SUMMARY FOR 1891.

(IN BUSHELS.)

DISTRICT.	SHIPPING MINES.				NON-SHIPPING MINES.		TOTALS.	
	Mines	Lump	Other Grades	Total	Mines	Total Product	Mines	Product
Western	45	16,957,187½	21,793,533	38,750,670½	16	1,035,582½	61	39,786,253
Southeastern	31	7,809,598½	13,942,126½	21,751,725	1	30,000	32	21,781,725
Northeastern	16	6.493,514½	4,615,629	11,109,443½	....	....	16	11,109,443
Totals	92	31,260,250	40,351,588	71,611,839	17	1,065,582½	109	72,677,421

SUMMARY FOR 1892.

(IN BUSHELS.)

DISTRICT.	SHIPPING MINES.				NON-SHIPPING MINES.		TOTALS.	
	Mines	Lump	Other Grades . . .	Total	Mines	Total Product . . .	Mines	Product . . . .
Western	48	16,681,996	25,357,780	42,039,776	15	990,217	63	43,029 993
Southeastern.	36	7,214,956	13,715,991	20,930,947	1	60 000	37	20,990,947
Northeastern	16	5,121,290	5,193,160	10,314 450	1	1,000	17	10,315,450
Totals.	100	29,018,242	44,266,931	73,285,178	17	1,051,217	117	74,336,390

SUMMARY FOR 1893.

(IN BUSHELS.)

DISTRICT.	SHIPPING MINES.				NON-SHIPPING MINES.		TOTALS.	
	Mines	Lump	Other Grades	Total	Mines	Product	Mines	Product
Western	47	16,956,043	27,165,082	44,121,125	5	768,547	52	44,889,672
Southeastern	42	8,256,819	18,321,352	26,578,171	1	45,000	43	26,623,171
Northeastern	18	5,001,102	4,958,855	9,954,957	....	......	18	9,954,957
Totals	107	80,213,964	50,440,289	80,654,253	6	813,547	113	81,467,800

OUTPUT BY COUNTIES.

According to production, for the respective years indicated, the counties producing 100,000 tons and over have ranked as follows:

1891.	1892.	1893.
1. Hopkins.	1. Hopkins.	1. Hopkins.
2. Ohio.	2. Whitley.	2. Whitley.
3. Laurel.	3. Ohio.	3. Ohio.
4. Whitley.	4. Muhlenberg.	4. Muhlenberg.
5. Muhlenberg.	5. Laurel.	5. Laurel.
6. Boyd.	6. Boyd.	6. Knox.
7. Carter.	7. Carter.	7. Boyd.
8. Pulaski.	8. Henderson.	8. Carter.
9. Knox.	9. Knox.	9. Union.
10. Henderson.	10. Union.	10. Henderson.

In the following table the net ton is used, being more convenient than the bushel in such arrangement of figures.* In this table cannel is included with the "bituminous," in such counties as produce both varieties of coal, and is so indicated that the respective amounts of each sort may easily be ascertained, if deemed desirable.

The table shows the output by counties for the calendar years 1892 and 1893, and also exhibits the gains and losses for 1893. The results of a comparison of the 1893 output with that for 1891 are also given. It will be observed that although Laurel and Pulaski counties show gains over 1892, they still show a decrement from the output of 1891:

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* The ton may readily be converted into bushels by adding two naughts and dividing by 4.

OUTPUT BY COUNTIES.

FOR THE CALENDAR YEARS 1892 AND 1893.

County.	1892.		1893.		Gain for 1893.	Loss for 1893.	1893 Compared With 1891.	
	Mines.	Tons.	Mines.	Tons.			Gain for 1893.	Loss for 1893.
Butler	1	18,953.52	1	22,465.12	3 511.60	......	10,918.12	......
Christian	2	32,768.84	1	35,671.40	2,902.56	......	2,036.40	......
Crittenden	2	3,913.80	1	160.00	......	3,753.80	......	2,072.00
Daveiss	10	23,551.36	3	15 887.32	......	7,664 04	......	731.86
Hancock	4	17,747.32*	4	28,104.14‡	5,356.82	......	4,961.68	......
Henderson	5	117,488.52	5	110,906.60	......	6,576.92	4,770.80	......
Hopkins	11	736,765.98	12	761,074.52	24,308.54	......	86,502.00	......
McLean	2	15,270.68	2	3,111.00	......	12,159.68	......	20,398.56
Muhlenberg	8	299,541.00	8	315,724.16	16,183.16	......	50,658.22	......
Ohio	9	329,985.64	8	354,670.28	24,684.64	......	17,156.52	......
Union	8	101,590.60	7	121,278.92	20,688.32	......	33,783.32	......
Webster	2	37,077.76	2	35,789.28	......	1,338.48	3,146.12	......
Western District	64	1,734,649.72	54	1,799,792.54	97,635.84	31 492.92	......	......
Bell	2	16,528.00†	6	67,595.84§	51,067.84	......	34,825.00	......
Clay	1	2,400.00	1	1,800.00	......	600.00	600.00	......
Knox	1	105,980.04	1	160,285.76	54,305.72	......	49,214.88	......
Laurel	18	251,068.68	16	285,982.32	34,913.64	......	......	18,888.00
Pulaski	4	78,023.96	4	90,990.60	12,966.64	......	......	22,625.88
Rockcastle	1	11 285.16	1	9,005.24	......	2,229.92	......	748.40
Whitley	10	374,671.86	14	455,811.08	81,189.72	......	157,819.24	......
Southeastern District	37	839,907.88	48	1,071,470.84	234,398.56	2,829.92	......	......

*Includes 18,450 tons of cannel. †Includes 270 tons of cannel. ‡Includes 4, 205.86 tons of cannel. §Includes 6,544 tons of cannel.

OUTPUT BY COUNTIES—Continued.

County.	1892.		1893.		Gain for 1893.	Loss for 1893.	1893 Compared With 1891.	
	Mines.	Tons.	Mines.	Tons.			Gain.	Loss.
Boyd	2	162,556.64	2	153,813.32	. . . . .	9,243.82	. . . . .	24,984.08
Breathitt	1	13,088.92	1	7,829.54	. . . .	5,259.88	. . . . . .	2 972.86
Carter	11	156 918.60*	9	132 509 26§	. . . . .	24,409 34	. . . . . .	35,625.61
Greenup	1	2,831.38†	1	1,385.67†	. . . . .	1,445.71	1,215.67	. . . . . .
Johnson.	2	27,450.28†	2	24 859.17†		2,591.11	8,790.17	. . . . .
Lawrence	4	84,785.01‡	4	93,774.55	8,989.51	. . . . . .	2,852.55	. . . . .
Magoffin	1	850.00†	1	380 00†	. . . . . .	470.00	. . . . . .	. . . . .
Menefee.	1	4,260.00	1	115 40	. . . . . .	4,144.60	. . . . . .	1,284.60
Lee	. . . .	. . . . .	3	16,850.22	16,850.22	. . . . .	. . . . .	. . . . .
	23	452 740.86	24	430,987.12	15,839.73	47,563.46	. . . . .	. . .

The Western District shows a net gain of 66,142 tons for 1893 over 1892, all of which was bituminous coal. In this District there was, at the same time, a net loss of 123,848 tons in the outward shipments of the shipping counties that show gains of production ; and it may be remarked that the increase of production was principally in the counties from which shipments to other States are made.

The Southeastern District shows a net gain of 231,563 tons over 1892, including some cannel.

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* Includes 8,760.20 tons of cannel.
† All cannel.
‡ Includes 281 tons of cannel.
§ Includes 5,309 tons of cannel.
‖ Includes 885 tons of cannel.

SELLING VALUE OF BITUMINOUS COAL—1892 AND 1893.

The selling value of cannel is not given for the reason that, under present conditions, such a statement would practically be a disclosure of individual prices.

The following table exhibits the selling value of the total bituminous product (commercial) for the calendar year 1892:

SELLING VALUE FOR 1892.

TOTAL COMMERCIAL BITUMINOUS PRODUCT.

DISTRICT.	Product in Tons (2,000 Pounds).	Selling Value at Mines.	Average Value Per Ton.
Western	1,721,199.74	$1,383,000.184	$0.8035
Southeastern*	837,237.87	803,861.639	0.9601
Northeastern	412,618.02	381,856.383	0.9254
For all Districts.	2 971,055.63	$2,568,718,206	$0.8645

*Garrard's mine (Clay county)—2,400 tons—is omitted.

The value of the product of the shipping mines was as follows:

SELLING VALUE FOR SHIPPING MINES—1892.

DISTRICT.	Product in Tons (2,000 Pounds).	Selling Value at Mines.	Average Value Per Ton.
Western	1,681,591.04	$1,340,187.805	$0.7969
Southeastern	837,237.87	803 861.639	0.9601
Northeastern	412,618.02	381,856.383	0.9254
For all Districts.	2,931,446.93	$2 525,905.827	$0.8616

The following table exhibits the selling value per ton, on board at the mines, of the bituminous product reported for the calendar year 1893:

SELLING VALUE FOR 1893.

DISTRICT.	Product in Tons (2,000 lbs.)	Selling Value at Mines.	Average Value Per Ton.
Western	1,795,586.88	$1,411,510.8463	$0.7861
Southeastern*	1,063,126 84	1,027,713.1330	0.9666
Northeastern	398,198.29	398,244.7094	1.0001
For all Districts. . . .	3,256,912.01	$2,837,468.6887	$0.8712

* Garrard's mine (Clay county)—1,800 tons—is omitted.

The value of the product of the shipping mines was as follows:

SELLING VALUE FOR SHIPPING MINES—1893.

DISTRICT.	Product in Tons (2,000 lbs.)	Selling Value at Mines.	Average Value Per Ton.
Western	1,764,845.00	$1,373 441.0843	$0.7782
Southeastern	1,063,126.84	1,027,713.1330	0.9666
Northeastern	398,198 29	398,241.7094	1.0001
For all Districts.	3,226,170.13	$2,799,398 9267	$0.8677

THE CANNEL MINES.

In consequence of lack of transportation facilities for the counties in which the larger basins are to be found, there has not been much change, from year to year, in the production of cannel since 1888. The future in this respect, however, is very promising. It is expected that within the present year railroad transportation will be given the cannel fields of Morgan county, the stores of which are among the very best in the State. Some cannel has been shipped down the South Fork of the Kentucky river from Owsley county, as the tides would occasionally serve, but no statement of the number of tons could be obtained; it is known, however, that the amount was small. It is to be regretted that a special description of the cannel fields of Owsley, Jackson, Clay, Perry, Leslie, Harlan, etc., could not be included in Mr. Hendrie's excellent paper on cannels presented in this Report. The present writer hoped to in a measure supply the information, but was prevented by the same circumstances that have limited the Report in other directions. What matter has been prepared is, therefore, held for a succeeding Report.

Compared with that for 1892 the tonnage of cannel for 1893 shows a decrement of 10,304 tons, which is principally due to the closing of the Breckenridge mines in Hancock county, the store of known workable cannel there being practically exhausted.

The output of cannel, in net tons, according to counties, for the calendar years 1892 and 1893, was as follows:

OUTPUT OF CANNEL FOR 1892 AND 1893.

County.	Calendar Year 1892.		Calendar Year 1893.	
	Number of Mines.	Tonnage.	Number of Mines.	Tonnage.
Bell	1	270.00	2	6,544.00
Carter	1	8,760.20	2	5,309.00
Greenup.	1 Gr.	2,831.38	1 Gr.	1,385.67
Hancock.	2	13,450.00	2	4,205.86
Johnson	2	27,450.28	2	24,859.17
Lawrence	1	231.00	1	855.00
Magoffin	1	850.00	1	380.00
Totals	9	53,842.86	11	43,438.70

SUMMARIES FOR BITUMINOUS AND CANNEL MINES, for 1893.

OUTPUT.

District.	Tons of Bituminous.	Tons of Cannel.	Total Product.
Western	1,795,586.88	4,205.86	1,799,792.74
Southeastern	1,064,926.84	6,544.00	1,071,470.84
Northeastern	399,198.28	32,788.84	430,987.12
Totals	3,258,712.00	43 538.70	3,302,250.70

MAXIMUM EMPLOYES.

District.	Bituminous Mines.		Cannel Mines.		Totals.	
	Number of Mines.	Employes . . .	Number of Mines.	Employes . . .	Number of Mines.	Employes . . .
Western	52	4,858	2	85	54	4,943
Southeastern	43	4,227	2	66	45	4,293
Northeastern	18	1,585	6	456	24	2,041
Totals.	113	10,670	10	607	123	11,277

PRODUCTION OF COKE.

Aside from the operations of the St. Bernard Coal Company, in Hopkins county, comparately little progress has been made in the development of the coke industry within the last two years. In Union county the Ohio Valley Coal and Mining Company has completed ten ovens, begun in 1892, and in November last work was in progress on the building for the necessary washing plant. It is proposed to use two Campbell washers there. No coke has yet been made by that company, unless in an experimental way. It was deemed probable in 1892 that in 1893 the Monarch Coal and Coke Company, or its successors, would have the erection of a large coking plant under way in Pike county, but the work was postponed. Discussion of the project has been revived, preliminary surveys for the necessary railroad are under way, and encouraging reports as to probabilties for 1894 have been received, but no definite statement as to what may be expected can be made at this time.

TONNAGE OF COKE FOR 1892.

According to coal-fields, the tonnage of coke produced during the calendar year 1892, was as follows:

Western Field	31,455.95
Eastern Field	5,404.25
Total	36,860.20

This was a net increase of 4,166.40 tons over the production for 1891—all attributable to an increase of production by the St. Bernard Coal Company in the Western Field.

The production, according to counties by individual plants, was as follows:

Bell county.	At Southern Land Improvement Company's plant	4,892.25
	At Breckenr dge and Pineville Syndicate's plant	512.00
Total		5,404 25
Hopkins county.	At St. Bernard Coal Company's plant	31 455.95
Total for the year		36,8 0.20

The coke made at what is designated as the Southern Land Improvement Company's plant, was in part (1,400 tons) made by that company's predecessor, the Eastern Kentucky Coal and Iron Company. The larger part (422 tons) of the coke credited to the Breckenridge and Pineville Syndicate's plant was made by W. G. White & Co., lessees of Colliery No. 1, from the Cumberland Valley Colliery Company, before the Breckenridge and Pineville Syndicate obtained control. (The rather frequent changes in the control of the mines at Pineville has made it somewhat impracticable to keep the statistics relating to them distinct, without creating confusion.)

Compared with the tonnage of 1891, there was a decrement of 5,122.75 tons in the production of Bell county coke. The St. Bernard Company increased its production by 9,289.15 tons.

TONNAGE OF COKE FOR 1893.

The coke produced during the calendar year 1893 amounted to 46,147.75 tons, an increase of 9,287.55 tons over 1892. Compared with the output for 1891, there was an increase of 13,453.95 tons.

According to coal-fields, the tonnage for 1893 was as follows:

Western Field	34,813.65
Eastern Field	11,334.10
Total	46,147.75

The production, according to counties, by individual plants, was as follows:

Bell county.	Breckenridge and Pineville Syndicate's plant	2,046.00
	Central Appalachian Company's plant*	9,288.10
	Total	11,334.10
Hopkins county.	St. Bernard Coal Company's plant	34.813.65
	Total for the year	46,147.75

Compared with 1892, there was an increase of tonnage for each county as follows:

Increase for Bell county	5,929.85
Increase for Hopkins county	3,357.70
Total increase for 1893	9,287.55

The tonnage of 1893, compared with that for 1891, shows an increase of 12,646.85 tons for the St. Bernard Coal Company's plant (Hopkins county), and of 807.10 tons for the two plants in Bell county.

It may be well to state that the coke plants about Middlesborough are not in Kentucky, but in Tennessee, and this Office does not receive statistics from them. They are frequently mentioned as Bell county plants. As a matter of fact, the coal seams worked are, perhaps, best developed in Bell county, and the estates of some of the companies working them lie partly in that county; in one instance, indeed, the coal is mined in Kentucky from an opening on the Tennessee side; but the coke is made in Tennessee, and this Office has no means of securing returns from the companies in question.

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*The Central Appalachian Company, Limited, is the successor of the Southern Land Improvement Company in the control of these ovens.

BITUMINOUS AND CANNEL MINES.

NUMBER OF EMPLOYES AND DAYS WORKED.

CALENDAR YEAR 1893.

COUNTY.	No. of Companies, etc.	No. of Banks or Mines.	MAXIMUM EMPLOYES.				AVERAGE EMPLOYES.				TOTAL EMPLOYES.		DAYS WORKED.	
			Inside.			Outside	Inside.			Outside	Maximum	Average	No. of Distinct Establishments	No. of Days
			Diggers	Day hands.	Boys		Diggers	Day Hands.	Boys					
Butler	1	1	46	13	2	12	38	9	2	10	73	59	1	210
Christian	1	1	68	35	3	12	49	26	3	11	118	89	1	163.50
Crittenden	1	1	5	2	. . .	1	5	2	. . .	1	8	8	1	33
Daveiss	3	3	35	16	. .	10	27	8	. .	8	61	43	3	412.50
Hancock	3	4	144	22	1	22	95	14	4	20	189	133	3	389
Henderson	5	5	198	58	16	74	155	41	13	49	346	258	5	705
Hopkins	9	12	625	745	100	455	543	610	63	370	1,925	1 586	11	1,923.25
McLean	1	2	35	7	1	9	13	4	1	5	52	23	1	108
Muhlenberg	8	8	585	127	38	104	462	98	29	82	854	671	8	1 185.30
Ohio	6	8	550	105	33	145	475	96	25	116	839	712	6*	1 028.02
Union	4	7	209	68	9	77	119	54	7	50	363	230	4	880.50
Webster	1	2	78	19	6	12	48	10	4	8	115	70	1	200
Western District	48	54	2,578	1,223	209	933	2,029	972	151	730	4,943	3,882	45*	7,238.07

*No report of days from the Deanefield mine in Ohio county; hence it is omitted here. Otherwise there would be 7 distinct establishments reported for that county.

BITUMINOUS AND CANNEL MINES—Continued.

County.	No. of Companies, etc.	No. of Banks or Mines.	Maximum Employes. Inside. Diggers.	Maximum Employes. Inside. Day Hands	Maximum Employes. Inside. Boys	Maximum Employes. Outside	Average Employes. Inside. Diggers.	Average Employes. Inside. Day Hands	Average Employes. Inside. Boys	Average Employes. Outside	Total Employes. Maximum	Total Employes. Average	Days Worked. No. of Distinct Establishments	Days Worked. No. of Days
Bell	3	6	249	49	10	124	156	30	9	63	432	258	3	511.20
Clay	1	1	6	. . . .	. .	1	3	. . . .	. . .	1	7	4	. . .	?
Knox		1	207	40	20	83	199	33	14	43	350	289	1	261.75
Laurel	4	16	1,014	248	52	150	794	180	60	123	1,464	1,097	14	1,776.00
Pulaski	4	4	205	84	11	91	148	84	9	51	391	242	3*	608.95
Rockcastle		1	75	5	4	10	55	4	3	8	94	70	1	119
Whitley	9	14	1,034	207	80	234	850	139	67	170	1,555	1,216	9	1,232.25
Southeastern District	33	43	2,790	633	177	693	2,205	370	142	459	4,293	3,176	31*	4,509.15
Boyd	1	2	341	61	36	30	278	43	16	23	468	360	2	491.75
Breathitt	1	1	37	8	. .	10	20	2	. .	6	50	28	1	120.00
Carter	6	9	428	65	38	127	314	40	30	78	658	462	8	1,482.50
Greenup	1	1	25	?	?	?	20	?	?	?	25	20	. . . .	?
Johnson	2	2	132	12	3	44	119	9	2	40	191	170	2	508
Lawrence	2	4	212	103	4	127	156	58	5	65	446	279	2	480.05
Lee	3	3	128	14	4	36	106	11	4	22	182	143	3	415
Magoffin	1	1	5	. . .	. . .	. . .	3	.	. . .	. .	5	3	.	?
Menefee	1	1	8	8	1	4	8	8	1	4	16	16	1	82
Northeastern District	18	24	1,316	261	86	378	1,024	161	58	238	2,041	1,481	19	3,548.80

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*No report of days from Commercial Company in Pulaski county; hence it is omitted here. Otherwise, there would be 4 establishments reported for that county.

Following are summaries of the number of employes at the bituminous and cannel mines during the calendar year 1893, by Districts:

SUMMARY OF MAXIMUM EMPLOYES—1893.

DISTRICT.	Number of Mines. .	INSIDE.			Outside	Totals . . . .
		Diggers	Day-Hands . .	Boys		
Western.	54	2,578	1,223*	209	933	4,943
Southeastern.	43	2,790	633	177	693	4,293
Northeastern.	24	1,316	261	86	378	2,041
Totals.	121	6,684	2,117	472	2,004	11,277

* Includes "machine" men.

SUMMARY OF AVERAGE EMPLOYES—1893.

DISTRICT.	Number of Mines. .	INSIDE.			Outside.	Totals. . . . . .
		Diggers	Day-Hands . .	Boys		
Western.	54	2,029	972*	151	730	3,882
Southeastern	43	2,205	370	142	459	3,176
Northeastern.	24	1,024	161	58	238	1,481
Totals.	121	5,258	1,503	351	1,427	8,539

* Includes "machine" men.

Following is a summary of the days worked at the bituminous and cannel mines during the calendar year 1893, by Districts, with averages:

SUMMARY OF DAYS WORKED—1893.

District.	Separate Establishments.	Total Days Worked.	Average Days for District.
Western	45*	7,238.07	160.84
Southeastern	31†	4,509.15	145 45
Northeastern	19‡	3,548.30	186.75
Totals	95	15,295.52	. . . .
Average days for all Districts. 161.			

* Omitting Deanfield mine, not reported.

† Omitting Commercial Co.'s mine, days not reported. Garrard's mine (Clay county) is also omitted.

‡ Magoffin and Greenup cannel mines are omitted: no days reported.

SHIPMENTS TO LOUISVILLE.

Bituminous coal only is considered in the statistics relating to the Louisville market, presented in this Report. It may be remarked, however, that the consumption of anthracite there has steadily increased within the last three years, having grown from 6,000 tons in 1891 to 15,000 tons in 1893. (Saward's "The Coal Trade" for 1894.)

Some coal is brought from Indiana mines, and occasionally, perhaps, from Illinois. No record of the amount is readily obtainable, but it is known to be small. The only obtainable records of coal received from other States relate to "Pittsburgh" and "Kanawha," and they include practically all receipts from sources without the State. According to Mr. F. E. Saward's estimates, there were 1,125,000 less bushels of such coal brought to Louisville in 1893 than in 1892*. According to his estimates, there was a decrement of 75,000 tons (1,875,000 bushels of 80 pounds) in the receipts of Pittsburgh, and an increment of 30,000 tons (750,000 bushels) in the receipts of Kanawha.

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* "The Coal Trade," 1894.

The receipts of Pittsburgh coal have been constantly decreasing with each year since 1889, while those of Kanawha and from Kentucky mines have been increasing.

The shipments to Louisville, in bushels, for the calendar years 1892 and 1893, were as follows:

	Calendar Year 1892.	Calendar Year 1893.
Pittsburgh *a*	12,500,000	10,625,000
Kanawha *a*	3,125,000	3,875,000
Kentucky *b*	10,546,287	15,551,150
Totals	26,171,287	30,051,150

a. As estimated by Saward.

b. As reported to this office by the railroads. This includes "Jellico" and all other "bituminous" coal from Kentucky mines.

The shipments from the Kentucky mines during the calendar years 1892 and 1893, according to Districts, were as shown in the following tables. For the figures I am indebted to S. R. Knott, Esq., First Vice-President, Louisville & Nashville Railroad; C. F. Krebs, Esq., Auditor, Chesapeake, Ohio and Southwestern Railroad; G. H. Lamkin, Esq., Auditor, Louisville, St. Louis and Texas Railway, and to Chas. Davis, Esq., Comptroller of the "Associate Railways" (for the Louisville Southern).

TONS FOR CALENDAR YEAR 1892.

RAILROAD.	Western District.	Southeastern District.	Totals.
L. & N.	385	143,007	143,392
C., O. & S. W.	241,469	. . . .	241,469
L., St. L. & T.	33,345	. . . .	33,345
L. S.	. . . .	4,445	4,445
Totals	275,199	147,452	422,651

Of the shipments from the Southeastern District, 50,161 tons were of "Jellico" coal.

TONS FOR CALENDAR YEAR 1893.

RAILROAD.	Western District.	Southeastern District.	Totals.
L. & N.	222	243,322	243,544
C., O. & S. W..	335,309	. . . .	335,309
L., St. L. & T..	43,193	. . . .	43,193
Totals	378,724	243,322	622,046

In addition to the foregoing, there were a few tons of coal from Beattyville, Lee county, carried by the Louisville Southern Railroad, received from the Kentucky Union, but no report as to the exact number has been received.

Following is a statement of the receipts of coal at Louisville from Kentucky mines, in tons, for a series of years. Statistics for 1886 and 1887 are not given, the reason being that the reports received for those years covered the year ending June 30th, instead of December 31st:

LOUISVILLE SHIPMENTS FOR CALENDAR YEARS.

YEAR.	Southeastern District.	Western District.	Total Tons.
1884	30,415	93,693	124,108
1885	162,525*	108,568	271,103
1888	123,206*	173,498	296,704
1889	103,548	159,675	263,223
1890	102,021	211,842	313,863
1891	151,414	287,258	438,672
1892	147,452	275,199	422,651
1893	243,322	378,724	622,046
Totals	1,063,903	1,688,457	2,752,360

* Includes some coal from the Western District—less than 500 tons.

The shipments to Louisville in 1893 represent somewhat more than 19 per cent. of the total bituminous output for that year.

In 1891 the shipments represented a fraction over 15 per cent. of the total output, and in 1892 they represented a little more than 14 per cent. of the output.

OUTWARD SHIPMENTS.

The total shipments of bituminous coal to other States reported to this Office for the calendar year 1892 amounted to 955,057 tons, as follows:

CALENDAR YEAR 1892.

Western District, 28 companies	695,134.04
Southeastern District, 8 companies	168,567.00
Northeastern District, 4 companies	91,356 56
Total tons	955,057.60

The counties from which shipments were made were Butler, Christian, Henderson, Hopkins, McLean, Muhlenberg, Ohio, Union and Webster, in the Western District; Bell, Laurel (very small amount), Pulaski and Whitley, in the Southeastern District, and Boyd, Carter and Lawrence, in the Northeastern District.

A few of the mines which reported outward shipments in 1892 failed to do so in 1893, They are the Sturgis and Robertson's in the West, and the Dowlais and Procter in the Southeast.

The total outward shipments reported for 1893 amounted to 682,795 tons, as follows:

CALENDAR YEAR, 1893.

Western District, 24 companies	536,996.84
Southeastern District, 5 companies	69,386.48
Northeastern District, 6 companies	76,411.92
Total tons	682,795.24

Assuming that the shipments of the companies from which reports for 1893 are missing were the same as in 1892, there was a decrease in the outward shipments for 1893 as follows:

Western District, decrease of	155,537.20 tons.
Southeastern District, decrease of	23,565.52 tons.
Northeastern District, decrease of	14,944.64 tons.
Total decrease of	194,047.36

The somewhat puzzling fact of diminished outward shipments, notwithstanding an increase of production, in a "dull year," has already been commented upon. The Western counties from which outward shipments are made that show gains in production increased their production by 92,278 tons, but there was a loss of 123,049 tons in their shipments to other States.* In the Southeast, the counties making outward shipments, (omitting Laurel, which ships little), made a gain of 195,544 tons in production, but lost 23,569 tons in outward shipments—assuming that the unreported shipments from Dowlais and Procter amounted to as much as in 1892. The Northeastern District shows a loss in production for 1893, and the only outward-shipping county which increased its production shows a loss in its shipments to other States.

The significance of loss in outward shipments in face of increased production, with respect to prices, is not easy to determine. As shown by the figures given elsewhere as to the selling value of the coal at the mines, and as is well known in mining circles, the margin for profit has been very narrow; but just what bearing the fact of increased production with diminished outward shipments really has had on prices can not be clearly understood without definite knowledge as to the receipts of coal from other fields than ours. It is a known fact that although the receipts of "Pittsburgh" coal, at the various Kentucky markets, were less than in 1892, there was a considerable increase in the amount of the West Virginia product brought to Kentucky. Another lacking element is knowledge as to the increased requirements for coal within the State during the last year.

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*Assuming that the unreported shipments of two mines were the same as in 1892.

SUMMARY OF BITUMINOUS PRODUCTION BY YEARS.

The following table exhibits the output of the commercial bituminous collieries for a series of years:

FOR CALENDAR YEARS.

(IN TONS OF 2,000 POUNDS.)

YEAR.	Northeastern District.	Southeastern District.	Western District.	Total Tons.
1881 . . .	?	?	804,281	?
1882 . . .	539,700		760,300	1,300,000
1883 . . .	267,257	360,000	945,412	1,572,669
1884 . . .	278,630	395,770	875,600	1,550,000
1885 . . .	280,595	456,000	863,405	1,600,000
1886 . . .	706,757		943,243	1,650,000
1887 . . .	350,564	600,339	982,282	1,938,185
1888 . . .	376,425	729,447	1,286,186	2,342,058
1889 . . .	405,361½	630,496½	1,169,576	2,205,434
1890 . . .	457,430	725,917	1,299,797	2,483,144
1891 . . .	444,378	871,268	1,591,450	2,907,096
1892 . . .	412,618	889,637	1,721,200	3,073,455
1893 . . .	398,198	1,064,927	1,795,587	3,258,712

The cannel product is not included in the above. The figures for the years prior to 1888 are largely estimative, but care was taken to have them as nearly accurate as possible; they are the most accurate that are obtainable.

CORRECTION.

Page 57. In the Table, the total tons for 1892 should read 2,973,455, instead of 3,073,455. (The tonnage given for each District is correct.)

IV.

ACCIDENTS.

A number of minor accidents of no consequence have been reported to this Office for each of the years 1892 and 1893 that are not recorded. Slight injuries and hurts that lasted only three or four days are not deemed worthy of note; a bruised thumb, a scratched hand, a slightly "mashed" foot, though painful at the time, are rather trivial—certainly not of sufficient importance to be recorded among the accidents arising from the especial perils of coal mining.

CALENDAR YEAR 1892.

During the calendar year 1892 forty-five noteworthy accidents occurred at the mines, forty of them occurring underground. Eight were fatal, causing three widows and five orphans.

The following table exhibits the number arranged according to causes:

Causes.	Fatal.		Serious.		Not Serious		Total.	
	In.	Out.	In.	Out.	In.	Out	In.	Out.
Falls of top	4	...	5	...	7	...	16	...
Falls of coal	...	...	7	...	1	...	8	...
Cars	...	...	4	...	5	...	9	...
Premature blast	...	...	2	...	2	...	4	...
On slope	...	1	1	...	...	...	1	1
In shaft	1	...	...	...	...	...	1	...
Miscellaneous	...	2	...	1	1	1	1	4
Totals	5	3	19	1	16	1	40	5

The following tables exhibit the number of accidents (for 1892), arranged according to Districts:

WESTERN DISTRICT.

(1892.)

CAUSES.	FATAL.		SERIOUS.		NOT SERIOUS.		TOTALS.	
	In.	Out.	In.	Out.	In.	Out.	In.	Out.
Falls of top	1	...	2	...	5	....	8	...
Falls of coal	...	...	5	...	1	....	6	...
Cars	...	...	4	...	4	....	8	...
Premature blast	...	...	...	...	1	....	1	...
On slope	...	1	1	...	...	....	1	1
In shaft	1	...	...	...	...	....	1	...
Miscellaneous	...	...	...	1	1	1	1	2
Totals	2	1	12	1	12	1	26	8

Tons of product raised per fatal and serious inside accident 123,903 55
Tons raised per inside fatality 867,324.86

SOUTHEASTERN DISTRICT.

(1892.)

CAUSES.	FATAL.	SERIOUS.	NOT SERIOUS.	TOTAL.
	All Inside.	All Inside.	All Inside.	All Inside.
Falls of top	8	1	....	4
Falls of coal	......	2	....	2
Premature blast	......	......	1	1
Totals	8	3	1	7

Tons of product raised per fatal and serious accident inside 139,984.66
Tons raised per inside fatality 279,969.29

There can be little question that a complete list of accidents; excepting fatalities, was not received from this District.

NORTHEASTERN DISTRICT.

(1892.)

CAUSES.	FATAL.		SERIOUS.		NOT SERIOUS.	TOTALS.	
	In.	Out.	In.	Out.	In.	In.	Out.
Falls of top	...	...	2	...	2	4	...
Cars	...	...	...	...	1	1	...
Premature blast	...	...	2	...	.....	2	...
Miscellaneous	...	2	...	...	.....	...	2
Totals	...	2	4	...	3	7	2

Tons of product per serious accident inside 118,185.21

It is doubtful whether a complete list of accidents, except fatalities and the more serious ones, was reported from this District.

Considering only those mines at which inside fatalities occurred, the tonnage raised per fatality at each mine was as follows:

Western District:

Henderson mine:* Tons raised per fatality	14,628.76
Dovey's mine: One fatality. Tons raised	82,014.88

Southeastern District:

Lily mine: One fatality. Tons raised	24,123.76
Kensee mine: One fatality. Tons raised	81,524.46
Procter mine: One fatality. Tons raised	116,370.00

CALENDAR YEAR 1893.

Eighty-five noteworthy accidents were reported for this year. A system of monthly reports having been required by the revised mining law, which went into effect in February of this year, a more complete list was secured than had been possible hitherto. Seventy-one of the accidents occurred underground. There were twelve fatalities, causing six widows and sixteen orphans.

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* The one fatality here occurred in the shaft. The foreman's arm was broken by a falling bolt, and death resulted from blood poisoning following amputation.

The following table is a summary of the accidents grouped according to causes :

CAUSES.	FATAL.		SERIOUS.		NOT SERIOUS.		TOTALS.	
	In.	Out.	In.	Out.	In.	Out.	In.	Out.
Falls of top.	9	. . .	15	. . .	15	. . .	39	. . .
Falls of coal	. . .	. . .	3	. . .	5	. . .	8	. . .
Cars	. . .	. . .	1	. . .	5	. . .	6	. . .
In shaft	1	. .	. . .	. . .	1	. . .	2	. . .
Fire-damp	. . .	. . .	. . .	. . .	1	. . .	1	. . .
Missed shot.	1	. . .	. . .	. . .	1	. . .	2	. . .
Premature blast	. . .	. . .	. . .	. . .	1	. . .	1	. . .
On incline	. . .	1	. . .	. . .	. . . .	. . .	. . .	1
Miscellaneous	. .	. . .	4	2	8	11	12	13
Totals	11	1	23	2	37	11	71	14

The following tables exhibit the number of accidents (for 1893) arranged according to Districts :

WESTERN DISTRICT.

(1893.)

CAUSES.	FATAL.		SERIOUS.		NOT SERIOUS.		TOTALS.	
	In.	Out.	In.	Out.	In.	Out.	In.	Out.
Falls of top	. . .	. . .	5	. . .	3	. . .	8	. . .
Falls of coal	. . .	. . .	2	. . .	3	. . .	5	. . .
Cars	. . .	. . .	1	. . .	4	. . .	5	. . .
Fire-damp	. . .	. . .	. . .	. . .	1	. . .	1	. . .
In shaft	1	. . .	. . .	. . .	1	. . .	2	. . .
Miscellaneous	. . .	. .	4	1	5	11	9	12
Totals	2	. . .	12	1	17	11	30	12

Tons of product raised per fatal and serious accident inside	138,445.59
Tons of product raised per fatal inside accident	1,799,792.74

SOUTHEASTERN DISTRICT.

(1893.)

CAUSES.	FATAL.		SERIOUS.		NOT SERIOUS.		TOTALS.	
	In.	Out.	In.	Out.	In.	Out.	In.	Out.
Falls of top	7	. . .	9	. . .	8	. . .	24	. . .
Falls of coal	. . .	. . .	1	. . .	2	. . .	3	. . .
Cars	. . .	. . .	. . .	. . .	1	. . .	1	. . .
Premature blast	. . .	. . .	. . .	. . .	1	. . .	1	. . .
Missed shot	1	. .	. . .	. . .	1	. . .	2	. . .
On incline	. . .	1	. . .	. . .	. . . . .	. . .	.	1
Miscellaneous	. . .	. . .	. . .	1	1	. . .	1	1
Totals	8	1	10	1	14	. . .	32	2

Tons of product raised per fatal and serious inside accident 59,526.15
Tons raised per inside fatality 133,933.85

NORTHEASTERN DISTRICT.

(1893.)

CAUSES.	FATAL.	SERIOUS.	NOT SERIOUS.	TOTAL.
	All in.	All in.	All in.	All in.
Top	2	1	4	7
Miscellaneous	. . . . . .	. . . . . .	2	2
Totals	2	1	6	9

Tons of product raised per fatal and serious inside accident 148,662.37
Tons raised per inside fatality 215,493.56

The tonnage raised per inside fatality at those mines where such fatal accidents occurred, was as follows:

Western District:

Reinecke mine: One fatality*. Tons raised 97,750.44

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* Occurred in the shaft.

Southeastern District:

North Jellico mine: One fatality. Tons raised	160,285.76
Altamont mine: One fatality. Tons raised	22,888.24
Pitman mine: One fatality. Tons raised	63,733.20
Kensee mine: Three fatalities. Tons per fatality	25,465.66
Mt. Ash mine: One fatality. Tons raised	51,279.96
Procter mine: One fatality. Tons raised	118,197.00

Northeastern District:

Kilgore No. 5 mine: One fatality. Tons raised	25,084.12
"Peach Orchard" mines. One fatality. Tons raised	90,199.55

In the following descriptive lists, the quoted remarks are statements made by the company reporting. Accidents which occurred within the first half of 1892, and were reported in the Report for that year, are not re-mentioned here, but they are included in the numerical lists that have been given.

BOYD COUNTY.

Kilgore No. 5 Mine, of the Ashland C. & I. R'y Co.—Ezra Beals, a miner. April 28, 1893. Fatally injured by fall of top coal and rock. Died April 29th. Was drawing a pillar. Widow and 6 children.

Rush Mine No. 6, of the A. C. & I. R'y Co.—Ben Thomas, driver; an adult. Foot injured by mine wagon. Off four weeks. Not serious. Nov. 9, 1892.

2. Sam Burton, miner; an adult. Foot injured by fall of slate. Off two weeks. Not serious. Oct. 15, 1892.

3. Grant Wallace, road-layer; adult. Back injured by fall of slate. Not serious. Dec. 4, 1892.

a. Alonzo Lanhorn (?), miner, adult. Injured by moving mine cars. Not serious. Feb. 15, 1893.

b. Isaac P. Collins, miner; adult. Head injured by water car. Not serious. June 19, 1893.

BELL COUNTY.

Breckenridge and Pineville Syndicate Mine.—John Reid, miner; adult. Head injured by a blown-through shot. Not serious. Jan. 16, 1893.

2.—James D. Murphy, miner; an adult. Arm broken and body bruised by fall of roof. February 28, 1893.

3.—Jerry Moseley, a miner; adult. Spine injured by fall of slate. March 31, 1893.

BUTLER COUNTY.

Aberdeen Mine.—Otis Harreld, a car-trimmer; boy. Foot injured by car. Off 8 days. "Carelessness." Aug. 28, 1893.

CARTER COUNTY.

Mt. Savage Mine.—John Roop, a miner; an adult. Leg broken by fall of slate. Oct. 3, 1892.

Jackson Lowe, a miner; boy. Head injured by falling sandstone. "Recovered in few days." June 6, 1893.

Star Furnace Mine, of Norton Iron Works Co.—Wm. McKenzie, miner; an adult. Ankle crushed by fall of slate. Idle two weeks. August 17, 1892.

Music Mine.—Alfred Oraynor, engineer; adult. Run over by train on tramroad. Killed. Got off train while it was in motion. Dec. 1, 1892.

2.— —— Huffman, a miner; boy, of 15 years. Found dead in tramroad tunnel. Supposed to have been following the engine through, and, being overcome by gas, was run over by engine on its return trip. October 18, 1892.

Stinson (Cannel) Mine, of Lexington & Carter County M'g Co.—John Moore, miner; adult Leg bruised by fall of slate. February 22, 1893.

HANCOCK COUNTY.

Breckenridge Co.'s Mine.—Thomas Comiskey, miner; an adult. Collar bone fractured by fall of slate. Accident occurred close to the coal face. August 9, 1892.

Tom Staples, miner; adult. Head injured by fall of rock. "Not serious." April 22, 1893.

Jas. Gillans, miner; adult. Crushed about body by fall of following stone. "Not serious. At work again" (in February). January 9, 1893.

HENDERSON COUNTY.

Baskett Mine.—Fred Gruthoff, miner; adult. Leg broken by fall of coal. December 14, 1892.

Henderson Mine.—Peter Hess, bank boss. Left arm broken by iron bolt falling down shaft, he being at the bottom, putting in mine pump. Arm amputated. Died of blood poisoning Sept. 7th, 1892. Widow and four children. Accident occurred August 10, 1892.

HOPKINS COUNTY.

Accidents in 1892, in addition to those enumerated in Report for 1892, are as follows:

Co-operative Mine.—J. Vickory, miner; adult. Shoulder blade broken and ankle fractured while mining under standing shot. Lost 10 weeks. October 24, 1892.

Lee Gamblin, driver; adult. Fingers mashed by being caught between car and rib. Lost 17 days. June 17, 1892.

Crabtree Mine.—J. M. Roy, miner; adult. Severely but not seriously injured by fall of loose slate at face of his room, while he was taking down coal. December 6, 1892.

Hecla Mine.— ——Vincent; boy. Leg broken by falling or jumping off moving bank-car and car running over him. "Recovered very quickly." 1892.

Earlington No. 9 Mine, of St. Bernard Coal Co.—John Webb, miner; colored, adult. Small bone of leg broken by fall of coal. Was mining under standing shot. July 2, 1892.

Wyley Johnson, on tip; colored, adult. Skin torn from right hand while spragging cars. Lost one week. Oct. 13, 1892.

Henry Coleman, miner; adult. Hips bruised by fall of slate while loading car of coal. Had tried to take down this piece of slate the day before; had forgotten about it the day he was hurt. Should have either wedged it down, or set a prop under it. Oct. 19, 1892.

Henry Wyatt, timberman and trackman; adult. Ankle sprained by fall of slate. Was setting a prop. Lost about ten days. Oct. 20, 1892.

E. Pritchett, double-team driver; colored, adult. Foot sprained by being caught between bumpers. Was riding between first and second car on trip going down grade; first car was derailed. Not serious. Lost one week. Nov. 30, 1892.

Thomas Campbell, loader; colored, adult. Nose injured while assisting to replace a derailed car. Was using wooden bank-rail as a lever; rail broke and one piece struck nose. Lost 3 weeks. Nov. 8, 1892.

Several minor accidents occurred not deemed worthy of note.

Earlington No. 11 Mine, of St. Bernard Coal Co.—Roy Hopgood, laborer; adult. Little finger of right hand nearly severed. Shoveling dirt with another man and was struck by edge of shovel. "Clear case of awkwardness." Lost one month. Sept. 14, 1892.

Ed. Graves, miner; colored, adult. Tamping a "snake" hole. Tamper struck fire and cartridge exploded. Hands, arms and breast burned. Head bruised by flying coal. "Not very serious. It is altogether probable that his cartridge was too large for hole, and consequently burst—leaving powder scattered along the needle. He did not have much experience as a miner." Oct. 17, 1892.

Theodore Wilson, loader; adult. Scalp cut by small piece of falling slate. Lost one week. Dec. 16, 1892.

Diamond Mine, of St. Bernard Coal Co.—Alvin Stokes, trapper; boy. Leg broken by being caught between rib and loaded car. Dec. 30, 1892.

Reinecke Mine.—Alexander Nisbet, miner; adult. Back bruised by fall of slate. Knocked down, and when he fell three teeth were knocked out. "Back at work a few days after it occurred." August 12, 1892.

Accidents in and about the mines of this county (Hopkins) for 1893 were as follows:

Co-operative Mine.—James Green, Superintendent. Ankle dislocated and ribs crushed by fall of slate. Lost three weeks. March 17, 1893.

Thos. Williams, miner; adult. Shoulder bone cracked by falling coal. Was mining a standing shot. October, 1893.

Three minor accidents were reported not deemed worthy of note.

Oak Hill Mine.—W. T. Stull, driver; boy. Hand mashed. Lost two weeks. February 28, 1893.

Earlington No. 9 Mine, of St. Bernard Coal Co.—Jack Stokes, carpenter; boy. Driving piece of timber with adze; adze slipped and cut leg. Lost 2 weeks. July, 1893.

John Porter, driller and blaster for machines; colored, adult. Helper let lighted lamp fall into powder from overturned can. Porter was burned about face, hands and back by resulting flash. (Helper not burned.) January 9, 1893.

Several trivial accidents were reported not deemed necessary to record.

Earlington No. 11 Mine, of St. Bernard Coal Co.—J. D. Harris, miner; adult. Collar bone and left leg broken and heel crushed. Partial amputation of leg necessary. Caused by fall of slate, due to "knocking out props against orders.' March 20, 1893.

John Underwood, driver; boy. Hand mashed; lost middle finger of right hand. Caught between car and rib. December 23, 1893.

Tine Ashley, driver; adult. Ankle mashed—caught between car and prop. Went to work March 1st. January 27, 1893.

Ernest Blakely, laborer at coke ovens; adult. Injured by falling off ladder into slack bin. Lost a week. January 16, 1893.

John Griffin, engineer at washer plant. Arm caught in rope while putting on a belt. Wrist dislocated. Lost 3 days. January 18, 1893.

A few minor accidents were reported that are not deemed noteworthy.

St. Charles Mine.—George Sparks, machine runner; adult. Back slightly dislocated, causing partial paralysis of lower limbs, by fall of draw slate while he was running his machine. "Sparks knocked out two props which had been set by our machine foreman to hold up slate. This is positively against orders." March 14, 1893.

Thomas Hatchie, helper to Sparks; adult. Hurt at same time and from same cause as Sparks. Small bone in ankle fractured; breast slightly bruised. March 14, 1893.

Wm. Wiley, driver; boy. Foot mashed. Pulling cars on nut coal track; standing on end of car; other cars ran against cars he was standing on. Lost a week. December 11, 1893.

Porter Renfrow, colord; adult. Was walking track; stumbled and fell; side cut. Resumed work December 27th. Occurred December 8, 1893.

John Bolder, blacksmith. Eye hit by piece of steel while he was hammering. Off 5 days. December 20, 1893.

Tom Ferguson, machine runner; colored, adult. Eye injured by piece of coal. Off 5 days. Dec. 16, 1893.

Dow Martin, Jr., shoveler at machines. Leg badly, but not seriously, bruised by fall of coal. September 6, 1893.

One or two minor accidents were reported that are not deemed necessary to record.

Hecla Mine.—Pius Smith. Hand mashed while letting out a loaded car on the railroad track. Amputation necessary. March, 1893.

Reinecke Mine.—Drew Tapp, laborer; colored, adult. Leg cut by being caught between cars while unloading dirt. Resumed work by March. February 8, 1893.

Wm. Campbell, laborer; colored boy of 18 years. Caught between ascending cage and shaft. Killed. August 14, 1893.

John Iglehart; boy of 15. Scalp wound. Fell into nut coal elevator. Soon recovered. August 26, 1893.

Two minor casualties, not deemed necessary to record, were reported.

KNOX COUNTY.

North Jellico Mine.—Lee Jordan, miner; adult. Back, side, breast, right leg and ankle injured by fall of slate. Recovered. April 10, 1893.

Jas. Cox, miner. Badly injured by fall of slate. Recovered. July 19, 1893.

D. M. Higgins, miner. Skull crushed by fall of slate; death instantaneous. Left wife and 3 children. December 8, 1893.

LAUREL COUNTY.

Lily Mines.—Jesse Williams, miner. Injured by fall of slate, and died ten days thereafter. Unmarried. Nov. 10, 1892.

Union Mine—James Flynn, miner; an adult. Leg and arm bruised by fall of coal. Not serious. June 15, 1893.

Ance Gloore, miner; a boy. Nose broken and face cut by slate shot in entry. "His own neglect." January 3, 1893.

Laurel Mine.—James Darroch. Leg broken by fall of coal. August, 1893.

Pitman Mines—L. E. Pike, miner; adult. Bruised "slightly" by fall of slate. "Sept." (August?), 15, 1893.

Fred Binder, miner. Back broken by fall of draw slate. Widow and 2 children. January 28, 1893.

Peter Baxter, miner; adult. Hip and ankle hurt by fall of draw slate. January 10, 1893.

James Gilbert, a boy. Caught in cog-wheels in screen-room. Arm dislocated at elbow; slightly hurt in side. January, 1893.

Slight injuries from falls of draw slate to August Binder, James Penman and James Reynolds were reported. Also one to Jasper Reynolds, from premature blast.

Star Mine.—Wm. Hunt, miner; boy of 19. Knee injured by fall of top coal. Lost about 3 weeks. January 12, 1893.

Altamont Mine.—Haines McCormick, miner; adult; killed by fall of slate. Unmarried. January 29, 1893.

George Morris, miner; adult. Rib broken by fall of slate. March, 1893.

Diamond Co.'s Mine.—Lee Robinson, miner; adult. Foot crushed by fall of slate. April 26, 1893.

George Morris, miner; adult. "Slightly" hurt by fall of slate. June, 1893.

LAWRENCE COUNTY.

Annie and Elizabeth Mines of Great Western Mining and Manufacturing Co.—James Music, miner; adult. Internally injured by fall of slate. Died February 27th. Widow and two or three children. January 13, 1893.

Jas. A. Castle, miner; adult. Injured by fall of slate. Rapidly recovered. February 10, 1893.

Andrew Hottenger, laborer; adult. "Limb" broken by a fall of a "kettle bottom." "The man was an inexperienced miner, but the accident might have occurred to any one working as he was." October 26, 1893.

LEE COUNTY.

Crystal Creek Mine.—Aaron Hall, miner; adult. Hips injured by fall of slate. Off a week. August 5, 1893.

McLEAN COUNTY.

Island Mine.—Frank Beechly (Buchly ? or Buckly ?), a miner; adult. Right shoulder strained. Was being lowered in shaft by hand; drum "got loose," and he caught on one of the buntons or cross-timbers. Quickly recovered. July 14, 1893.

MUHLENBERG COUNTY.

Central Mine. — George Cheatham, colored miner. Leg broken by fall of coal. Nov., 1892.

Dovey's Mine.—Lewis Bolin, miner; adult. Caught by slate fall on corner of car, and ribs crushed. Died October 5, 1892. Occurred Sept. 29, 1892.

Mud River Mine.—R. A. Wright, miner; adult. Jaw bone fractured by fall of slate. Recovered and at work in 25 days. August 5, 1893.

Charles Ross, miner; adult. Face and arm injured by fall of coal. "Recovered in one week." Oct , 1893.

OHIO COUNTY.

Williams Mine.—Andrew Goned (?), day hand. "Crippled by the shot of a miner blowing through a pillar. He only lost 7 days from work." May, 1893.

Samuel James, mine boss. Hand mashed while coupling cars at bottom of slope. Lost a week. May, 1893.

Elijah Fulkerson, an adult. Hand mashed while chocking railroad car at the chute. Lost 6 days. August, 1893.

K. V. Williams, Secretary. Bruised by being caught between wall of tip and derailed car. Lost 7 days. Oct., 1893.

Several minor accidents, some of them inside and some outside, were reported but are not deemed necessary to record here.

Josephine Mine.—(Now idle.) J. B. Carter, driver; adult. Foot injured by mine car. "Not serious." Dec. 6, 1892.

Render Mine.—John House (?), driver; adult. Repairing mule gears, with open knife in hand. Mule stumbled against him and knife was stuck in man's arm. Lost 6 days. Jan. 12, 1893.

Jake Westerfield, driver; adult. Car jumped track and mashed hand between car and rib. Not serious. Feb. 3, 1893.

Frank Cooper, driver; man. Fell off car, and foot and leg injured by being run over. Lost 9 days. Feb., 1893.

Several minor accidents, not necessary to record, were reported.

Taylor Mine.—Wm. Baltzell, outside day hand; adult. Fingers mashed coupling railroad cars. Resumed work March 8th. Occurred Feb. 6, 1893.

Henry Rowe, miner; adult. Ankle broken by fall of coal. Feb. 14, 1893.

Echols Mine.—Pres. Haden, driver; colored, adult. Leg broken. Caught between mine cars.

PULASKI COUNTY.

Barren Fork Mine.—George Stigall, miner. Severely, but not seriously, bruised. "Went back to investigate" a hanging shot. May 11, 1893.

Luther Henry (in May) and John Q. Peters (in February), received minor injuries.

Greenwood Mines. — Mox Roeder, miner; adult. Ankle sprained and body bruised by fall of slate. "Fully recovered." "In his rush to do extraordinary work did not have time to set up props." August 1, 1893.

Isaac Hudson, miner: colored adult. Cheek and one arm cut by fall of slate. "Recovered in a few days." "Did not sufficiently prop top of his room." October 30, 1893.

UNION COUNTY.

Cumberland Mine.—John Miller, miner; adult. Caught between roof and car of coal while riding out on loaded trip, and collar bone broken. Returned to work in 30 days. May 1, 1893.

James Holeman; adult. Hand crushed by fall of coal. Returned to work August 5th. Occurred in July, 1893.

Charles Slaton, miner; adult. Injured by fall of slate. Off 5 days. Nov. 22, 1893.

Sturgis Mine—A. J. Mathieu, driller; adult. Set fire to firedamp in Second S. W. Entry and was burned about the face and hands. The following statement concerning this was made by J. E. Downing, Secretary and General Manager, under date of May 15, 1893: It was "nothing serious. He is long since well and is working . . . as usual. It was a matter of foolhardy carelessness on his part. He was drilling at night for us, and his orders were not to go into the Second S. W. Entry to drill, but he wanted to be smart and took the chances as an experiment." Occurred February 28, 1893.

An unnamed driver is reported to have been "slightly squeezed by cars." Off duty for a week. December, 1893.

WEBSTER COUNTY.

Providence Mine.—James Eaves, a driver. "Bruised up in trying to get out of the way of loaded cars. Disabled 15 days." September, 1893.

W. A. Montgomery, day hand. Hand crushed while cleaning out the elevator. Resumed work in one month. June 8, 1893.

WHITLEY COUNTY.

Procter Mine.—Jule Love (colored), a miner. Instantly killed by fall of slate in room. A widow, but no children. Oct. 16, 1892.

Jake Ellis, a miner. Killed by returning upon a hanging shot in entry. A widow but no children. July 7, 1893.

Kensee Mine.—Henry Dillard (colored), a miner. Killed by fall of slate. "Caused by his own neglect." Unmarried. Oct. 20, 1892.

William Hardwick, a miner. Killed by fall of slate. Following is the report filed, dated January 10, 1893, and signed "Perry Gorman, Bank Boss:" "Wm. Hardwick was kil'ed on No. 21 Entry on the night of the 9th instant. He was making room for double parting, and was wedging piece of a slate. Can see point of wedge on the top, but he went to work under same piece which caused it to give away and fall on him, thereby causing his death. Robert Hancock was notified not to supply him with any cars. I notified him myself not to proceed with same, and said the company would finish same on idle days with their day men." Was married. Family in England. January 9, 1893.

S. D. Moore, an adult. Foot bruised by bank-car. Walking about in two weeks with a staff. February 6, 1893.

George Bashiers, miner. Killed by fall of slate.

John Bashiers, miner; boy of 17. Killed by fall of slate.

Wm. Broyson (col.), miner. Bruised by fall of slate.

The following report was made concerning these accidents, under date of November 8, 1893, the time they occurred: "We regret to state that two falls of slate in separate rooms this morning killed one boy and injured two men." (George Bashier died subsequently.) "John Bashier, 17, killed. Geo. Bashier (father), left shoulder and two ribs fractured. Worked in room 36 on No. 21 Entry. Slate fall—size about 15 feet x 6 feet x 1 foot 4 inches. Distance of propped roof from face—13 ft. 4 inches, 12 ft. 6 inches, 7 ft. 10 inches, 7 ft. 6 inches. Found 20 props in the room ready for use. William Bryson (col.) worked in No. 29 room on Entry No. 16. Slate fall—14 feet 9 in. x 3½ ft. x 1 ft. 4 thick. Shoulder fractured. Roof propped from face 6 ft. 1 in., 7 ft. 8 in., 9 ft. 10 in. Found 4 props in room. Bank Boss, Jack Burns, warned Bryson of the slate, and told him to prop the very slate that injured him. This warning was given about one hour before the accident. Yours truly, Main J. Mt. Coal Co., by Hywel Davies, Gen. Mgr. The undersigned examined both rooms and certify that the above statement of condition of said rooms was as stated, but we are not aware of the warning given by the Bank Boss. H. G. Johnson, John Fraley, Ross Davis, Bank Committee. William Jones, Superintendent."

Central Jellico Mine.—John E. Bird, miner; an adult. "Badly mashed up" by fall of slate. "Recovered." Aug. 30, 1892.

W. H. Herald, miner; adult. Spinal column "fractured" by fall of slate when drawing a pillar. Was still living March 17, 1893, and reported "to be improving slowly." No subsequent report concerning him was received. Jan. 30, 1893.

Dowlais Mine.—Frederic Gazdy, miner; adult. Fatally injured by run away of cars on the incline; was thrown against the drum. Age, 63. March 6, 1893.

Jasper Greene. Thigh broken by fall of coal while undermining. July, 1893.

H. M. Barnes. Head slightly hurt and rib broken by fall of slate in his room. Dec. 12, 1893.

Mountain Ash Mine.—Robert M. Jones, miner; adult. Killed by fall of rock at head of entry. Widow and three children. Sept. 22, 1893.

Strunk's Lane Mine.—J. M. Webb. Back injured by fall of slate. "Not serious." Dec. 22, 1893.

V.

STRIKES.

Minor differences between the operator and employes, which did not assume the character of a formal strike and endured only three or four days, are not considered here.

During the calendar year 1893 there were eight strikes, of a week or more in duration, four in the Western District, three in the Southeastern, and one in the Northeastern. All except, perhaps, one (which was ended by a re-arrangement of the mining operations), were lost.

Following is a summary of the strikes:

MINE.	Average No. of Employes	Date of Strike . .	Days Lost	Termination . . . .
Alpine	63	May 4 . .	38	. . . . . .
Central Jellico	127	Sept. 10 . .	10	Lost.
Diamond Co.'s	145	May 1 . .	6	Lost.
Echols	71	June 15 . .	63	Lost.
Great Western M. & M. Co.'s.	264	Jan. 14 . .	30	Lost.
Hawesville Co.'s	53	June 6 .	14	Lost.
McHenry	153	June 15 . .	63	Lost.
Taylor	179	June 15 .	63	Lost.

In the following descriptive list, which is necessarily based upon reports received from the mining companies, the statements in quotation marks are as made by the company reporting. It would be well if the miners' side could also be received by this Department, but at present there is no method by which that may be secured.

HANCOCK COUNTY.

The Hawesville Coal Co.—A strike occurred June 6, 1893, the company having changed the pay-day from twice a month to monthly. Lasted two weeks. "Company won."

LAUREL COUNTY.

Diamond Coal Co.—A strike occurred May 1, 1893. "On account of changing a few men from old mines to the new mines." Lasted a week. "Men all went to work as they came out, the company retaining the right to work such men as they saw fit."

LAWRENCE COUNTY.

Great Western M'g and M'f'g Co.—A strike occurred at the "Annie" and "Elizabeth" mines January 14, 1893. "Caused by discharge of a troublesome and obnoxious employe, and member of the K. of L. The newly organized order here demanded his reinstatement." Lasted about 30 days, though there was "no absolute cessation of work." "Company demanded the disbanding of the order, saying it should not be recognized by them in the least. With the surrender of their charter and other concessions they were allowed to resume work." It is not improbable, from general report, that there was really something of a compromise in this case, the miners, however, upon the whole, losing.

OHIO COUNTY.

McHenry Coal Company.—A strike occurred at each of the mines, the Echols and McHenry, of this company, on June 15, 1893. Caused in each case, "by the company proposing to charge the same for fuel consumed by the miner that other mines on the line of the C., O. & S. W. were charging." Lasted 63 days. "Terminated by the miners consenting to pay the same price that other companies charged."

Taylor Coal Company.—A strike occurred June 15, 1893. Lasted 63 days. Due to the same cause as that at McHenry, and terminated in the same way. The miners had been paying 85 cents a load for their fuel, delivered. The change made was to 75 cents a load, as at the other mines.

PULASKI COUNTY.

Richmond Coal Co.—A strike occurred at the Alpine mine of this company on May 1, 1893. Caused by "discharge of a miner." Lasted 38 days. Termination: "Subcontracted for three months."

WHITLEY COUNTY.

Central Jellico Coal Co.—A strike occurred in September. The reason given is thus indefinitely stated: "One man took room without the consent of the Bank Boss." Lasted 10 days. Terminated "in favor of the company."

VI.

LIST OF COMMERCIAL MINES.

Following is a list of the operators putting out commercial coal, *i. e.*, coal which is shipped to the general market, or which enters the local market in competition with the product of "shipping mines." A few "local" mines (indicated by the letter "L") are included here, since the list of local mines which has usually been given, is omitted from this Report, for reasons given beyond. New mines which are not fairly opened, and mines which have been idle throughout the year 1893, are not included. The individual mines are described in the chapter entitled "Notes on the Mines."

WESTERN DISTRICT.

NAME OF OPERATOR.	Post-office.	County.	Number of Banks.	Character.
Aberdeen Coal and Mining Company	Morgantown	Butler	1	Drift.
J. F. Phillips	Morgantown	"	1	"
Empire Coal and Mining Company	Empire	Christian	1	Shaft.
Davis & Pike	Caseyville, Union county	Crittenden	1	Drift.
Barnaby & Son	Sturgis, Union county	"	1	Slope.
H. S. Bennett (Conn's Mine)	Commercial Point, Union Co.	"	1	"
C. L. Nall.	Owensboro	Daveiss	1	Shaft.
New Holland Coal Company	"	"	1	Drift.
A. R. Brucks ("Deane's mine") (L)	"	"	1	Shaft.
Meiss & Shafer ("Bon Harbor") (L)	"	"	2	Drift.
E. Parsons (L)	"	"	1	Shaft
R. E. Patrick (L)	"	"	1	Drift.
J. H. Rudy (L)	"	"	1	Shaft.
Smith & Ford ("Hinkel")	Petrie Station	Hancock	1	Drift.
Robert Duncan	Falcon	"	1	"
Breckenridge Company (Limited)	Cloverport, Breckenridge Co.	"	1 (Group)	Drifts.
Hawesville Coal Company (Falcon)	Hawesville	"	1	Drift.
Green River Coal and Mining Company	Spottsville	Henderson	1	Shaft.
Henderson Mining and Manufacturing Company	Henderson	"	1	"
The Jorris Bartley Mining Company	"	"	1	"
Corydon Coal Company	Corydon	"	1	"
Baskett Coal Company	Baskett	"	1	"
Green River Coal Company (Shiver's)	Spottsville	"	1	"
Carbondale Coal and Coke Company	Hamby's Station	Hopkins	1	Drift.
Hecla Coal and Mining Company	Earlington	"	1	Shaft.
St. Bernard Coal Company	"	"	2	Drift and Slope.
" " "	Morton's Gap	"	1	Drift.
" " "	St. Charles	"	1	"
J. L. M. Robertson & Son	Earlington	"	1	"
Oak Hill Coal and Mining Company	Nortonville	"	1	"
Madisonville Coal Company	Madisonville	"	1	Shaft.
Reinecke Coal Company	"	"	2 (1 Idle)	"

Co-operative Mining and Manufacturing Company	Barnsley	Hopkins	1	Drift.
Crabtree Coal Mining Company	Ilsley	"	1	"
McKenney & Stanley	Island	McLean	2	Shaft and Drift.
Central Coal and Iron Company*	Central City	Muhlenberg	3 (2 Idle)	Shafts and Slope.
W. H. Dovey, Dovey's Kentucky Mines	Mercer Station	"	1	Shaft.
Lessees Memphis Coal and Mining Company	Bevier	"	2 (1 Idle)	Shaft and Drift.
Mud River Coal, Coke and Iron Company	Mud River	"	1	Slope.
Black Diamond Coal Company	Drakesboro	"	3 (2 Idle)	Shaft and Slopes.
J. Wm. Jones, Lessee	Paradise	"	1	Drift.
Hillside Coal Company	Mercer Station	"	1	Shaft.
Greenville Coal Company	Powderly	"	1	"
McHenry Coal Company	McHenry	Ohio	1	Slope.
" " "	Echols	"	1	Shaft.
Taylor Coal Company	Taylor Mines	"	1	Drift.
Central Coal and Iron Company (Render)	McHenry (Hamilton)	"	1	"
Gaines' Coal Company	Fordsville	"	2	"
D. S. Miller, Lessee Ætna Colliery	Ætnaville	"	1	Shaft.
Worrall Mountain Coal and Mining Company	Reynolds Station	"	1	"
Williams Coal Company	McHenry	"	1	Slope.
George Egan	Fordsville	"	1	Drift.
John Sayres, Sr.	DeKoven	Union	1	Slope.
Ohio Valley Coal and Mining Company	"	"	3	Slopes.
Sturgis Coal and Coke Company	Sturgis	"	1	Shaft.
" " " "	"	"	2 (1 Idle)	Slopes.
Cumberland Coal Company	"	"	1	Slope.
B. C. Davidson	Uniontown	"	1	Shaft.
Providence Coal Company	Providence	Webster	2	Shaft and Drift.

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* Also Lessees of Muhlenberg, Richmond and the Green River Mines, Muhlenberg county. All idle.

SOUTHEASTERN DISTRICT.

NAME OF OPERATOR.	Post-office.	County.	Number of Banks.	Character.
Central Appalachian Company, Lessee	Pineville	Bell	3	Drifts.
Breckenridge and Pineville Syndicate	"	"	8	"
St. Vincent Coal and Coke Company	"	"	1 Group	"
Log Mt. Coal, Coke and Timber Company	"	"	1	Drift.
Gen. T. T. Garrard	Manchester	Clay	1	"
North Jellico Coal Company	Grays	Knox	1	"
W. A. Pugh	Pittsburgh	Laurel	2	"
Peacock Coal Company	"	"	1	"
Union Coal Company	"	"	1	"
Pitman Coal Company	"	"	2	"
Victoria Coal Company	"	"	1	"
Wm. Welsh, Lessee	"	"	1	"
Laurel Coal Company	"	"	1	"
Nickel Plate Coal Company	East Bernstadt	"	2	Drifts.
Star Coal Company	" "	"	1	Drift.
Litton Coal Company	" "	"	1	"
Pearl, Thompson & Co. (Standard)	Altamont	"	1	"
Manchester Coal Company	"	"	1	"
Altamont Coal Company	"	"	2	"
Diamond Coal Company	"	"	1	"
Lily Coal Company	Lily	"	2	"
Commercial Coal Company	Parker's Lake	Pulaski	1	"
Cogar's Cr. M'g and Coal Company	Flat Rock	"	1	"
Richmond Coal Company	Alpine	"	2	"
Barren F'k M'g and Coal Company	Flat Rock	"	1 Group	"
Beaver Cr. and Cumberland River M. and C. Co.	Greenwood	"	1 Group	"
Greenwood Coal Company	"	"	1 Group	"
Pine Hill Coal and Iron Company	Pine Hill	Rockcastle	1	"
Bryant Brothers	Pine Knot	Whitley	1	"
Jellico and Birdeye Coal Company	Halsey	"	8	"
Procter Coal Company	Red Ash	"	3	"
East Tennessee Coal Company	Jellico, Tenn.	"	3	"

Main Jellico Mountain Coal Company	Kensee	Whitley	2	Drift.
Central Jellico Coal Company	Pleasant View	"	1	"
Pine Knot Coal Company	Strunk's Lane	"	1	"
Jellico Coal Mining Company	Mountain Ash	"	3	"

NORTHEASTERN DISTRICT.

Name of Operator.	Post-office.	County.	Number of Banks.	Character.
Ashland Coal and Iron Railway Co. (at Kilgore and Rush)	Rush	Boyd	8	Drifts.
Kentucky Union Land Company	Jackson	Breathitt	1	"
Lexington and Carter County Mining Company	Music	Carter	2	"
" " " " " "	Mt. Savage	"	1	"
Strait Creek Coal Company	Denton	"	1	"
Willard Coal Company	Willard	"	1	"
Eastern Kentucky Railway Company	"	"	1	"
Mary Coal Company	Denton	"	2	"
Norton Iron Works (at Kilgore)	Ashland, Boyd county	"	2	"
Kentucky Cannel Company (at Music)	Grayson	"	1	"
Eastern Kentucky Railway Company	Greenup	Greenup	1 (Group)	"
White House Cannel Coal Company	Myrtle	Johnson	1	"
Sandy River Cannel Coal Company	"	"	1	"
Great Western Mining and Manufacturing Company	Peach Orchard	Lawrence	2	"
Torchlight Coal Company (at Torchlight Station)	Louisa	"	2	"
Avent Beattyville Coal Company	Beattyville	Lee	1	"
Beattyville Coal Company	"	"	1	"
Crystal Creek Coal Company	"	"	1	"
Colvin Coal Company	Bethel, Bath county	Magoffin	1	"
W. T. Dennis	Rothwell	Menefee	1	"
J. M. Brown	"	"	1	"

LOCAL MINES.

The list of local mines hitherto published is omitted, since it has not been possible to thoroughly revise it in time for this Report. Many of the mines hitherto listed have either been suspended or abandoned, and many more have been opened. As may readily be understood, this list varies considerably from year to year, and at no time may a definite statement be given as to how many mines, in this class, are subject to inspection. A local mine in which seven or eight miners may be employed in certain months, may in others be idle or give employment to only two or three persons.

VII.

NEW AND OTHER MINES.

During the calendar year 1893, 26 new commercial mines were opened, either by new operators (of which there were 16), or by the older companies in addition to, or in place of, their original mines.

In addition, a large number of small mines were opened, some of which may become subject to inspection during the coming year.

The new commercial mines are distributed among the Inspection Districts as follows: Western District, 8 new mines, 8 new operators; Southeastern, 14 new mines, 5 new operators; Northeastern, 4 new mines, 3 new operators. Six mines were reopened, and 11 suspended.

Following are

THE NEW MINES.

1. *The Standard*, near East Bernstadt, Laurel county, on the Manchester Railroad. This is quite a new mine, the development of which was begun by Pearl, Thompson & Co., at the close of the year. The seam worked is the "Laurel."

2. *The Manchester Coal Co.* has opened a mine on the Manchester Railroad, Laurel county, and has been shipping since August. The company is not incorporated, and is composed of Jno. W. Harris, A. W. Harris, and C. R. Coleman.

3. *Messrs. Smith & Ford* opened the "Hinkel" mine near Petrie Station, in Hancock county (L., St. L. & T. R. R.), in the latter part of 1893. The seam ranges from 24 to 34 inches in thickness, and is a "block" coal. The company will probably make an opening nearer to the railroad, since the coal has now to be hauled three-quarters of a mile before being loaded for shipment.

4. *The Bryant Brothers' Mine*, near Pine Knot, Whitley county. This mine, locally known as "Towe Wad," has been shipping since February 1, 1893. Its existence was not known, however, until discovered by the Assistant Inspector last December, since this Department had received no notification of its opening. Operated by L. E. and D. E. Bryant. See "Notes on the Mines."

5. *C. L. Cornwell* opened a drift mine near Falcon, Hancock county, on the L., St. L. & T. Railroad, in the latter part of the year. The drift was in about 100 feet on October 9th. The seam, which is the same as that worked at the Falcon mine, is 36 to 42 inches thick. So far as known, no shipments have yet been made.

6. *The St. Vincent Coal and Coke Company* has commenced opening mines near Pineville, Bell county. The officers are: C. T. Samuels, President; J. H. Allen, Vice-President and General Manager; Frank Marimon, Secretary and Treasurer. The seam opened is about 36 inches thick. Above that are two others, reported to measure respectively 64 and 40 inches in thickness. Where opened the 64-inch bed is said to show 11 inches of cannel, which is supposed to be (and probably is) equivalent to the cannel bed worked at West Pineville. Mr. Allen states that it is proposed to work both of the upper beds, and bring the coal to a single tipple "later on." Up to this writing only the preliminary work has been done.

7. *The Carbondale Coal and Coke Co.* opened a mine, in the latter part of the year, near Hamby Station (C., O. & S. W. R.

R.), in Hopkins county. The seam measures as high as 66 to 68 inches in thickness. See "Notes on the Mines."

8. *The Beattyville Coal Co.* opened a mine near Beattyville, Lee county, in August, and is shipping regularly. See "Notes on the Mines."

9. *The Arent Beattyville Co.*, near Beattyville. This company was mentioned in the Report for 1892, among those proposing to open mines. The mine was opened in 1893. See "Notes on the Mines."

10. *The Log Mountain Coal, Coke and Timber Company*—one of those mentioned in the Report for 1892 as proposing to open mines—opened the "Mary Hull" mine in 1893. The mine is in Bell county, in the Log Mountains, about 12 miles from Pineville, and is reached by a railroad line built by the L. & N. R. R. Co. See "Notes on the Mines."

11. *The Crystal Cr. Coal and Coke Co.* opened a mine near Beattyville, nearly opposite the Beattyville mine.

12. *The Commercial Coal Company* opened a mine near Parker's Lake P. O., in Pulaski county, and makes shipments *via* the Cincinnati Southern Railroad. See Notes on the Mines.

13. *Mr. John Sayres, Sr.*, opened a mine in "No. 10," or C, coal, near DeKoven, Union county. The coal is 34 inches thick. Coals A and B may be seen in the hill above, A being a mere smut, while B is 32 inches thick.

14. *J. F. Phillips, Esq.*, commenced the preliminary work of opening a mine near Aberdeen, a short distance below Morgantown, Butler county, on the Green river, in the fall of 1893.

15. *The Ashland Coal and Iron Railway Company* has opened a new mine, "No. 7," at Grant's Switch, in Boyd county.

16. *Robert Duncan, Esq.*, has opened a mine near Falcon, Hancock county, but up to this writing only preliminary work has been done. A spur from the L., St. L. & T. R. R. was being built to it in September, 1893. The spur passes near to, and will be used by, the Cornwell mine.

17. *Mr. George Egan* has opened a mine near Fordsville, Ohio, in which it is expected to work 8 or 10 miners.

18. *The Procter Coal Company* has opened a new mine, known as the Grinstead, on its property in Whitley county.

This is additional to the company's other mines. The "Jellico coal" is worked.

19. *The Main Jellico Mountain Coal Co.* has opened an additional mine at Kensee, in Whitley county.

20. *The East Tennessee Coal Co.* has opened an additional mine, in the Jellico seam, near Dowlais, Whitley county.

21. *The Green River Coal and Mining Co.* began the opening of a new mine near Spottsville, Henderson county. It is not known whether any shipments have been made. The officers of the company are: G. Rankin, President; W. J. Harris, Secretary and Treasurer; N. L. Eastin, General Manager.

22. *The Jellico and Birdeye Coal Company*, which was mentioned among the ones proposing to open mines in the Report for 1892, has opened mines in two distinct seams. There are practically three mines, omitting several small drifts in the "Birdeye coal," and classing the others in that coal as one mine. The product from the other mines is known as "Jellico" and "Vanderpool," the latter being in a seam that occurs high above the Jellico, and is locally known as the Vanderpool bed.

23. *The Cogar Creek Mining and Coal Co.* has opened a mine near Flat Rock, Pulaski county. The names of the officers have not been obtained. Mr. S. L. Boyer is the manager.

24. *The Central Appalachian Company* opened another mine (known as "Truxton C"), in the upper seam, at its colliery, near Pineville, Bell county.

REOPENED MINES.

1. What has been known for many years as the *People's Mine*, near Henderson, Henderson county, and which was shut down in the latter part of 1892 or early part of 1893, following the indictment and fine of Mr. P. J. McNamara, for failure to obey the mining law, has been reopened by the *Jorris-Bartley Mining Co.* See "Notes on the Mines."

2. *The Buckeye Mine*, near East Bernstadt, Laurel county, which has been closed for several years, was re-opened in July by Mr. John Sears, with 10 or 12 miners. It was soon closed down again, however, the reason being, it is understood, that there was too much water to contend with.

3. *Messrs. A G. White & Co.* have reopened what was known as the "Cumberland Colliery No. 1," near Pineville, under lease from the Breckenridge and Pineville Syndicate. Just to what extent the mine will be operated, however, is still an open question.

4. *The Worrall Mountain Coal and Mining Company* has reopened the Triplett Mine, at Reynolds' Station (Owensboro and Falls of Rough Railroad), in Ohio county. Hon. R. S. Triplett is General Manager. Mr. J. J. Dennis is in charge at the mine. No shipments are being made, the work being rather for the purpose of prospecting at present, than for development.

5. *The Conn Mines*, near Commercial Point, in Crittenden county, have been reopened by H. S. Bennett. The mine is in what is known in that region as the "4-foot" coal. The mine was re-opened in July or August. What shipments are made go by the Tradewater river to local points.

6. *The Beaver Creek and Cumberland River Mining and Coal Company* has commenced reopening the Beaver Creek Mines, in Pulaski county. These mines, which have been idle for several years, with their equipment have been described in former Reports. Officers of the new company are: O. V. Hensley, President; Geo. Wahnitz, Vice-President and Treasurer; Newton Evans, Secretary and General Manager; W. W. Rees, Mine Manager. It is stated that the new company expects to mine coal early in March next.

MINES SUSPENDED.

The following mines were either shut down temporarily or abandoned during the past year:

1. *The Breckenridge Co.'s Cannel Mines*, in Hancock county, were abandoned July 1, 1893, in consequence of the practical exhaustion of the known workable cannel.

2. *The Nickel Plate Company's Mine*, near East Bernstadt, Laurel county, was abandoned in July.

3. *The Pine Hill Coal and Iron Co.'s Mine*, near Pine Hill, Rockcastle county, was abandoned July 15th.

4. *Mr. J. M. Brown's Mine*, near Rothwell, Menefee county,

was closed early in the year. There is no probability of its being re-opened, for commercial purpose, since the railroad, which was expected to give it an outlet, has been torn up.

5. *The Indian Creek Mine*, of Mr. W. T. Dennis, near Rothwell, Menefee county, was closed early in the year. For the same reason that applies to Brown's, there is no likelihood that it will be re-opened for commercial purposes. It may be remarked that neither of these mines was important in a commercial way; that owned by Mr. Brown was little more than a "prospect" mine.

6. *The Sanders Mine* ("Josephine colliery"), at Reynolds Station (O. & F. of R. R. R.), Ohio county, was shut down late in 1892, and remained so during 1893.

7. *The Altamont Mines*, in Laurel county, were practically closed in July. Although the boundary of coal is not exhausted, the mines are practically worked out. It will be cheaper to open new mines than to attempt to renew mining at the old openings.

8. *The Little Fork Coal and Sand Co.'s Mine*, at Anglin, Carter county, was closed the latter part of 1892, and remained so during 1893.

9. *The Star Furnace Mines*, of the Norton Iron Works Co., near Kilgore, Carter county, are exhausted, and were abandoned in May, 1893.

10. *The Ætna Mines*, of Capt. W. A. Pugh, at Pittsburg, were abandoned in July, 1893.

11. *The Elkatawa Mine*, of the Kentucky Union Land Co, was shut down in September, 1893.

PROPOSED MINES.

Mr. D. P. Whitsett, associated with certain Pittsburgh, Pa., parties, has been prospecting the coal seams near Artemus, in Knox county (Cumberland Valley Branch of the L. & N. system), for several months. In a letter to this Department he states that he may commence mining in March, 1894. The following reference, presumably to this company, appeared in the *Coal Trade Journal*, of November 1, 1893: "N. P. Hyndman and A. H. Whitsett, of Pittsburgh, Pa., have formed a company to work in Kentucky. * * * The company will be known as the Bennett Birdeye Coal Company, and the capitalization is $200,000. Of this amount $100,000 has been subscribed."

At Beattyville. Messrs. Hewitt, Norman & Co., whose proposed operations were mentioned in the Report for 1892, expect to begin mining in 1894.

Near Artemus, Knox county. The following paragraph appeared in the *Manufacturers' Record* for December 29, 1893: "John Blythe, James W. Shields, Dr. L. V. Sutton and Alexander Moreland, of West Newton, Pa., are negotiating for 10,000 acres of the celebrated birdeye cannel coal, near Artemus. If the sale is completed, and matters are very favorable for it, a $1,000,000 company will be formed to develop the property, with Mr. Moreland as Manager." No direct information concerning the proposed company has been received by this Department.

The Monarch Coal Company. This company, whose proposed operations in Pike county were mentioned in the Report for 1892, not having secured the necessary railroad facilities, did no mining in 1893. The contract for the railroad has been let, however, and engineering parties are at work along what is understood to be the proposed route. No authentic information concerning the matter has been received by this Department, though efforts have been made to obtain it. The following statements have been printed: 1. Special to the *Louisville Times:* "Duluth, Minn., Dec. 22, 1893.—Wolf & King, railway contractors of this city, were to-day awarded the contract for building sixty miles of railway in Eastern Kentucky, connecting the coal-fields of Pike county with the Big Sandy river, at White House. The contract is for about $600,000, and the work is to begin very soon." 2. Paragraph in the *Manufacturers' Record*, January 12, 1894: "Wolf & King, of Duluth, Minn., who have the contract for building the sixty miles of railroad to the coal-fields in Eastern Kentucky, state that sub-contracts will be let for the work in about a month. Several bridges will be required."

Other mining operations are doubtless under consideration for 1894, but no information has been received concerning them.

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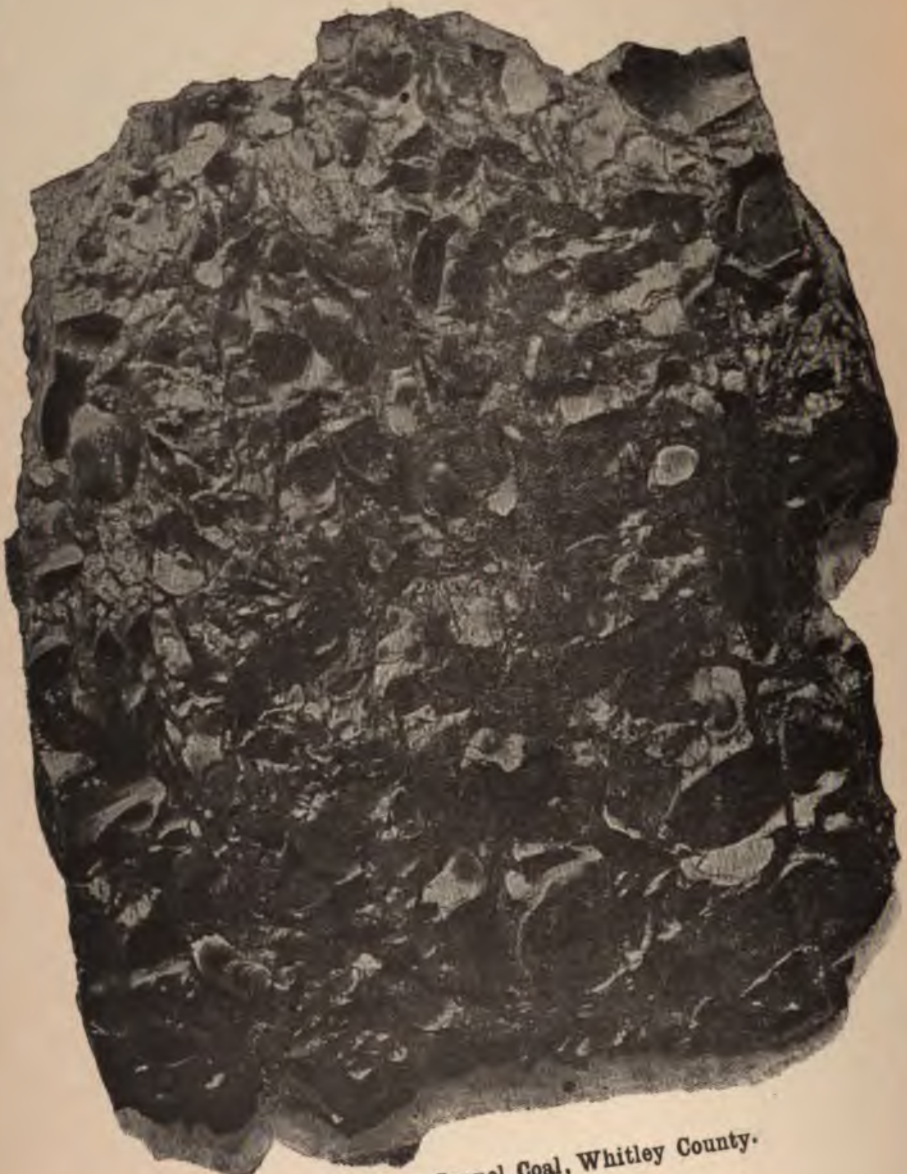

Birds-Eye Cannel Coal, Whitley County.

VIII.

KEYS TO THE COAL FIELDS.

[REVISED FOR 1893.]

According to the latest published determinations of the State Geological Survey, Kentucky has an aggregate of 15,680 square miles of coal-bearing measures. As is well known, there are two distinct fields, comprising a portion of the Appalachian, in the East, and a part of the Illinois, or Central, in the West. The areas of the two fields are as follows:

Eastern Field, square miles	11,180
Western Field, square miles	4,500
Total square miles	15,680

It will be seen that the State has between one-fifth and one-sixth of the Appalachian field, and between one-tenth and one-eleventh of the Central Field. A very large percentage of each field is productive, but, in consequence of the comparatively small amount of mining that has been done in the State, the area of easily accessible coals being considered, just what proportions are underlaid by workable coals has never been determined.

Although each field contains from six to eight usually workable seams,* the larger part of the product at present mined in each District is derived from two or three beds.

For the convenience of this Office, in part, and in part because of differences in the natural markets for certain mines, the coal-fields have been divided into four Inspection Districts, namely: The Western, including the entire Western Field, and the

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* This statement should not suggest the idea that there are only that many distinct coals which may be worked in each field. In some portions of each field beds which are not workable in others reach great thickness, and are among the most desirable seams to be found.

Northeastern, the Southeastern and the Elkhorn, in the Eastern Field.

The object at present being to furnish data, in a convenient form, for the use of prospectors, rather than to discuss the quality of the coals, analyses and particular descriptions of the several seams are omitted. Such information, so far as regards the general character of the beds, may be found in the Geological Survey reports or in the private reports from which the data for the compilation of the sections here presented were obtained. In the Report for 1894 this omission will be supplied.

THE WESTERN FIELD.

Although the longest known field, and the recipient of perhaps the larger part of the attention of the first Geological Survey, and of a large share of the work of the second one, less is really known about the details of the coal seams here—less is known concerning their persistency and individual characteristics—than is true of the beds in the less developed Eastern Field. This is due, in part, to the fact that the geology is usually masked, and in part to a misapprehension of the characteristics of the coal deposits. There are few hills of considerable altitude, and there are no deep gorges; bold exposures are rare, and the geology is much complicated by faults difficult to trace. The difficulties and eccentricities of the field were discounted by officers of the first Survey, and conclusions were reached which, proving erroneous in some instances, have been a source of confusion to all who have been unable to find a middle ground between the full acceptance of them and their total rejection. Many of the errors of the first Survey remain uncorrected, and a large part of the field is, therefore, still unknown ground—full of puzzles—to the average prospector, who may enter it with the reports of Dr. Owen in one hand and the incorrect "corrections" of them, by his Indiana and Illinois critics, in the other.

No attempt will be made in this Report to present a definite correlation of the coals of Kentucky, Indiana and Illinois, as has been tried by Prof. E. T. Cox, late State Geologist of Indiana, and Prof. A. H. Worthen, formerly State Geologist of

Illinois. To do so successfully would require more information concerning the details of each State—especially of the Kentucky measures—than any one yet possesses; and it seems probable that the conclusions of Cox and Worthen, concerning portions of their own respective fields, would require revision before they could be made available for the compiler working with Kentucky data.

The efforts of Cox and Worthen ended in their utter rejection of the Kentucky Section of Owen, and the subsequent construction of one, each, by themselves, which they believed (largely from "reasoning" rather than from observation) would serve better. In doing this they committed grave errors, which have served only to lead others astray. It is quite possible that had they known the characteristics of their own fields better at the time, they would have been more successful.

Prof. Cox, in a paper read before the American Association for the Advancement of Science, in 1871, and embodied in his second Report as State Geologist of Indiana (for the year 1870), page 166, *et seq.*, says: "From observations made in the Western Coal Fields, during the past three years, over portions of Southern Illinois, Western Kentucky and Indiana, so many errors have been found in the sections of the strata given in the third Kentucky Report, and which were pretty generally copied by other Geologists in more recent Reports, that I have found it necessary to make an entirely new classification of the coals of the West. In speaking of the errors in Dr. D. D. Owen's section of the Western coals, I do not want to be understood as referring to the errors of the sections published in the first and second Reports on the Geology of Kentucky, as some have supposed from reading the remarks on the subject made in my first Report on the Geology of Indiana, 1869, but to the subsequent general section to be found at pages 18–24, in the Third Volume Kentucky Report, published in 1857, in which some of the most glaring errors of the previously published sections are omitted."

Mr. Cox then "presents a column of the Kentucky coals as corrected by himself," which shows only nine coals above the "Millstone Grit," and is as follows:

	Feet.	Inches.
1. "Anvil Rock"	118	
2. Shale and thin coal	3	
3. Space	36	8
4. Coal No. 8	2	
5. Space	46	
6. Coal No. 7	5	
7. Space	41	
8. Coal No. 6	2	6
9. Space	45	
10. Coal No. 5	5	
11. Space	86	
12. Coal No. 4	2	6
13. Space	90	
14. Coal No. 3	3	
15. Space	24	
16. Coal No. 2	4	
17. Space	110	6
18. Coal No. 1	1	8
19. "Millstone Grit"	130	
20. Thin coal		3
21. Space	65	
[illegible]. Coal		8

Mr. Cox's own section contains "glaring errors" which, under the circumstances, are inexcusable.

Mr. Worthen, in volume III., Illinois Geological Survey Reports, page 1, *et seq.*, says:

"On taking charge of the Illinois survey, I thought it important, inasmuch as our coal-field was known to be the northern extension of the Kentucky basin, to establish, if possible, a parallelism between the coals of Illinois and those of Kentucky, as they were represented in the published sections of the Kentucky Reports, in regard to the correctness of which we had entertained no doubt, as they had been constructed under the supervision of that eminent geologist, the late Dr. D. D. Owen, whose reputation as a reliable practical geologist was second to no man's in the West. With this object in view, I secured the services of Prof. Leo Lesquereux, who had been employed in Kentucky, and was consequently familiar with the coals of that State; and, together, we visited, during the summer of 1860, the principal mines worked at that time in our State, examined the coals, making careful sections of the beds with which they were associated, and collected the fossils characteristic of the different groups, and the result of our observations was given in the first volume of the Report. Subsequently we became satisfied that some of the conclusions to which we had been led in regard to the position of some of our coal beds were erroneous, and we were finally compelled to believe, from further investigations, that the Kentucky section was incorrect; or else no parallelism could be made out between the workable coals of the two States.* For example, the *Aviculopecten rectilaterarea* (Cox's sp.), with the associated fossils, which in Kentucky was regarded as characteristic of their Coal No. 9, was found in Illinois in a much lower position, and characterizing a coal here which was not higher in the series than their coals No. 3 or 4, of their sections; and furthermore, we became satisfied that all the workable coals in Illinois were restricted to the lower part of the measures, and that we had no coals, except some thin beds of no practical value, that occupied as high a position in the series as Nos. 9 and 11 of the Kentucky section."

[But the fact is, that the principal coals of the Illinois section correspond to the upper coals of the Kentucky column, and that Nos. 5, 6 and 7 of Worthen's section correspond to Owen's 9, 10 and 11. And still there are eight coals below "No. 9" in Kentucky.—C. J. N.]

Mr. Worthen then gives a General Section for Illinois, a part of which is reproduced on Plate I, and continues:

"By comparing the foregoing with the Kentucky section, we shall find that there are no beds in Illinois that can be referred to those in that section intervening between the Mahoning and Anvil-rock sandstones,† and no sandstones associated with our upper coals that can properly be considered as the equivalent of the upper sandstone of their section, unless it is that over our coal No. 6. Hence, we are inclined to believe that two different outcrops of the same bed of sandstone in Kentucky have been mistaken for distinct beds, occupying different stratigraphical positions, and by adopting this supposition they have increased the thickness of the measures 300 feet or more than they really attain, and nearly doubled the number of their workable coals. That this is the true explanation of the want of parallelism between our section and theirs seems highly probable from the general correspondence of the strata for 300 feet below these sandstones, as illustrated by the subjoined sections of the strata as taken from the Kentucky section:

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*Mr. Worthen would, probably, have escaped some of his difficulties had more regard been paid to the work of his predecessor.—C. J. N.

†The so-called "Mahoning" sandstone of Owen's section, is a sandstone overlying his "No. 4" coal. Worthen has placed it over "No. 5." The "Anvil-rock" is the sandstone over Owen's "No. 12" coal. The name has no general significance. It was adopted from the local name given to a large fragment of the sandstone in question in Union county, which bears some resemblance to an anvil, and is a well-known landmark near DeKoven. By referring to the sections on Plate I, it will be seen how

Anvil-rock SS.	Mahoning SS.
Coal 3 feet.	*Coal 4 feet. (b)*
Shale 10 feet.	
Coal — feet.	
Shale 40 feet.	Shale 95 feet.
Coal 5 feet.	
Shale 60 feet.	
Coal 5 feet.	Coal 3 feet.
Shale 20 feet.	——— 25 feet.
Coal 6 inches.	Thin coal and limestone.
Shale 70 feet.	Shale 130 feet.
Coal 2½ feet.	Coal 2½ feet.
Shale 110 feet.	Shale 100 feet
Coal 3 feet (a)	Coal 1 foot 8 inches.

"The lower portions of these two sections correspond almost exactly the one with the other, while in the upper part the only variation consists in the intercallation of three beds of coal in the first hundred feet below the Anvil-rock, while there is but one in the same space below the Mahoning. But any one accustomed to working in the coal measures will see at a glance the probable syncronism of the strata in these two sections, for sections could scarcely be made through equivalent beds at

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utterly mistaken Prof. Worthen was in the statement, that "there are no beds in Illinois that can be referred to those in that section intervening between the Mahoning and Anvil-rock sandstones.' It may be remarked that the term "Mahoning" is, in fact, meaningless when applied to any sandstone in this field. It was used by Dr. Owen and Prof. Lesquereux, when they supposed that they had succeeded in finding a parallelism between the beds of this field and those of Pennsylvania and Ohio.

C. J. N.

twenty miles apart, anywhere in the measures, that would not show quite as marked a variation in the thickness and lithological characters of the strata, as are presented in those just given. Now, if we take from the Kentucky section this upper sandstone and the beds intervening between it and the Mahoning, we have a general correspondence between the sections in Illinois and Kentucky, perhaps as decided as could be expected to occur in remote portions of the same coal-field; the most important difference being in the aggregate thickness of the strata, a variation for which we have already suggested an explanation."

Prof. Cox and Prof. Worthen were, perhaps, both misled by their then misconceptions of their own respective fields. Their conclusions as to the Kentucky section, in any event, were certainly wrong; and the peculiarly erroneous "reasoning" followed by Prof. Worthen to demonstrate Owen's inaccuracy is amusingly illustrated by the fact that the coals marked (*a*) and (*b*)—by the present writer—in Worthen's "corrected section" are now worked, the one (*b*) immediately under the other (*a*), in the Ohio Valley Coal and Mining Company's slope, at DeKoven. The distance between them is 41 feet. The other coals indicated above the seam marked (*a*)—which, known as the "three-foot" at DeKoven, is "No 6" of Owen—appear in the hills there in such positions as to leave no room to doubt that they are above that coal.

That errors have been made as to the equivalency of beds in various parts of this field is undoubtedly true, but the results of investigations made in recent years, not only by myself, but by other and careful observers, and made under the advantages afforded by the increased development of mining, not only prove that there are, unquestionably, more than twelve distinct coal-beds in the Kentucky field, below the "Anvil-rock" horizon, but tend to verify the larger part of the section as constructed by Dr. Owen. Indeed, even though all the errors made by him be taken into account, the general accuracy of Dr. Owen's work, under the disadvantages and limitations environing him, is simply marvelous.

Since this chapter was originally prepared, I have made careful examinations of the coals in the region about DeKoven, Union county. Vertical and horizontal distances were carefully measured, and dips carefully noted. I verified the presence of every numbered coal that is given in Dr. Owen's Union County Section (as given in this Report), except his "No. 2;" that bed and the thin coal shown above his "No. 3" I did not see—yet both may be present. The distances between the coals as determined by myself and as given by Dr. Owen agree fairly well, down to the "No. 3" coal. The distance from that coal to "No. 1 B" is placed at about 155 feet by Dr. Owen, while I made it a little more than 300. This question is to be examined again. My impression is, however, that the distance is more nearly 300 feet in that region than less. In a section made for the Saline Coal and Manufacturing Co., of Illinois, (1855), Dr. Owen places the distance at 285 feet. Detailed results of my recent examinations in the DeKoven region are necessarily deferred, for reasons given in the letter of transmittal.

The Section for Union county, which has been verified from "No. 12" coal down to "No. 5," inclusive, and from "No. 1B" up to "No. 3," inclusive—subject to some modifications of intervals here and there—may stand as a key with which to work in the western and northwestern parts of the field, and it is presented for that purpose in Plate I.*

It is now clear that no single section will serve for all parts of the field—especially with respect to the beds below that known as "No. 8" coal. Below "No. 7" the coals are especially erratic.

Certain coals in the lower part of the Kentucky section thin out, or "feather," towards the north and northwest, while others which are poorly developed in this State become the principal beds in Indiana and Illinois, and additional "upper measures" come in. Our "No. 11," for example, is No. 7, and our "No. 9" is No. 5, of Illinois, while certain thin seams of Kentucky, like "No. 10," become important beds in that State. The fact seems to be that, in Indiana and Illinois only the upper part of

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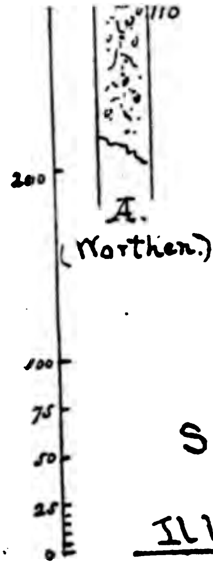
*Of the Illinois Sections shown on the Plate, "A" represents part of Worthen's General Section; "B" is Cox's Section for Gallatin county; and "C" is Owen's General Section of the measures in the Bowlsville region, made for the Shawneetown Coal Company.



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our section, above the Conglomerate, is well developed, and that it was lack of information on this point which probably misled Messrs. Worthen and Cox, and caused them to discredit the "Kentucky Section."

The idea that a coal found of considerable and notable thickness in one part of the field would necessarily be found in another part, the topography and order of beds permitting, has been the source of many of the erroneous conclusions concerning this coal-field, and has resulted in many disappointments for prospectors. It is now pretty well determined that even the strongly marked beds are not all co-extensive with the field; that seams well developed in the southeast may be absent in the northwest, and *vice versa*. This was suggested as far back as 1875 in the present writer's Report on the Geology of a Part of Ohio county, wherein it was stated: "Even those coals that may be regarded as comparatively constant are not, however, presumed to be present everywhere that their horizons are reached."

It is also pretty clear that some beds are not persistent as workable seams even in limited areas, and that some of them are distributed in pools rather than in even sheets; the "pools," however, not necessarily being the original form of the deposits, but, in some instances at least, being due to stream erosion after the coal had been formed in more or less sheet-like areas—the subsequent deposits of mud and sand filling up the eroded spaces with "shale" and "sandstone." Such eroded spaces may amount to acres in extent, or not exceed a few square feet. It is on this account that, while bore-holes are great helps in the search for coals, a single boring does not furnish absolute proof that a particular seam is absent from the region in which it is made. The hole may miss the coal in its workable thickness—pass to one side of it—by only a few inches. This may readily be demonstrated at a mine with which the writer is well acquainted.

The Union county Section, especially from No. 5 upward, *as a basis from which to work*, will serve for the larger part of the entire field.

The Ohio county Section, constructed from observations of the present writer, will serve the same purpose for the eastern and southeastern portions of the field, excepting those in the extreme southeast. For the latter part of the field, reference should be made to the sections of the conglomerate series given on a succeeding page.

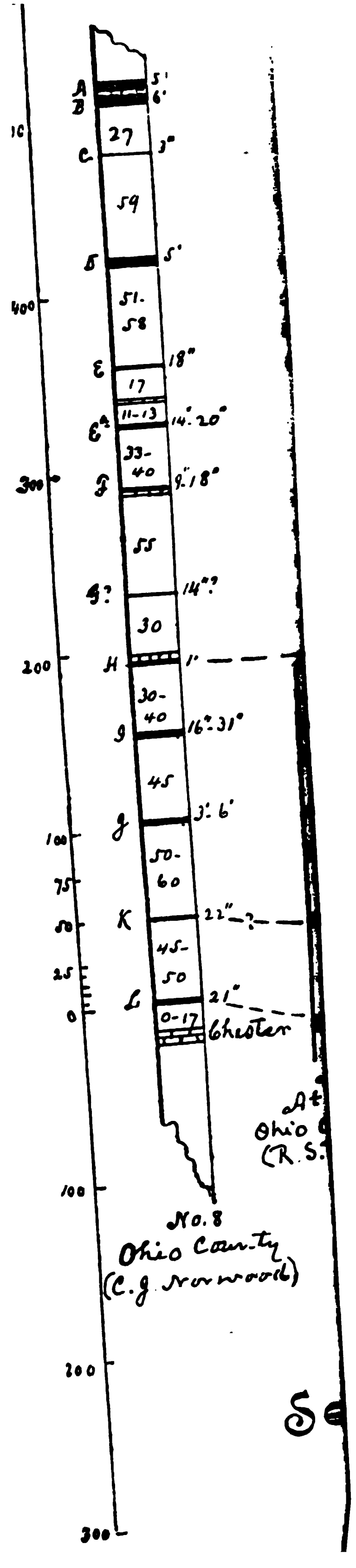
The other sections given on Plates I and II will aid in prospecting a large scope of territory lying within the particular part of the field where they were made.

Special descriptions of each of the coals will not now be undertaken, since it is desired and expected to pay attention to this in a succeeding Report. It is sufficient for the present to say that the various coals shown in the plates of sections are worked at the following points:

Coal 1 B, of Owen, or L of the Ohio county section, is worked at Barnaby & Son's mines, in Crittenden county; was worked at Hawesville; and is probably the one worked at Mud River, Empire and Aberdeen mines. It is the "Main Nolin" coal of Edmonson county, and is there, at places, an inter-conglomerate bed, the "Bee Spring Sandstone," above, sometimes appearing as a lean conglomerate. The coal frequently carries considerable cannel.

Of Coal 2, of Owen, little is known. It seems to be the one worked at Deanefield. The coal at that place corresponds to Coal K of the present writer, which has been regarded as the equivalent of Owen's No. 2. Coal K varies from nothing to thirty inches in thickness, where well recognized, in the eastern part of the field. It is the coal occurring at 20 feet below the "Bee Spring Sandstone," in Edmonson county.

Coal No. 3, of Owen, had not been seen by the present writer in the typical locality studied by Dr. Owen when this chapter was originally prepared. Since then, however, it has been inspected near DeKoven, Union county, where it has a thickness of 26 inches or more. Coal J, of the Ohio county Section, seems to occupy the horizon indicated for it in the Union county Section, with a shortening of the interval from 1 B. Coal J. is probably the coal worked at the Worrall Mountain and the Gaines mines, in Ohio county. A higher coal was, in a report of the present writer on the "Geology of the Region Adjacent to the Louisville, Paducah and Southwestern Railroad," 1875, referred to this number.



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Coal No. 4, of Owen, was not known in its typical locality by the present writer when this chapter was first written, but its outcroppings in Indian (or Curlew) Hill, near DeKoven, have since then been examined. This is the bed sometimes referred to as the "Curlew" coal in the Reports of Owen, and, apparently for no other reason than that it has a clay parting, has been declared by Mr. Cox to really be "No. 11" coal, which was worked at the old Curlew mines, about a mile northwardly from Indian Hill. I was unable to find a clean exposure of the bed, the old openings in it having fallen in (it was worked in a small way many years ago), and could not, therefore, obtain a measurement of its thickness. But it was demonstrated, beyond question, that the coal lies far below No. 11, at about the position assigned it by Dr. Owen. As it is intended in the general revision of this chapter to discuss this and other questions relating to the lower part of the "Kentucky Section" in detail, further comment on this point is reserved. I am unable to satisfactorily identify Owen's "No. 4" in the eastern parts of the field. Coal I of the Ohio county Section corresponds to it in the numerical order—from the base—and until within the last few months I have been disposed to regard it as probably the equivalent of "No. 4." At present, however, I prefer to defer that question until some additional light may be obtained. Coal I is the "Mannington Coal," of Hopkins county, and the "Mason Coal," of Hancock county.

Coal No. 5, of Owen, is worked at the mines of the Ohio Valley Coal and Mining Company, at DeKoven, in Union county, where it is known as the Four-foot coal. In some parts of the mine where this coal is wrought, the bed has an average thickness of 50 inches. Its maximum thickness is 54 inches, and its least, so far as known, is 32 inches. Where found in its least thickness the bed is in part cannel, the latter occurring about the middle of the seam, thus:

a. Bituminous coal	6 inches.
b. Cannel	20 inches.
c. Bituminous coal	6 inches.

Coal No. 6, of Owen, is worked at the mines of the Ohio Valley Coal and Mining Company, in Union county, where it is known as the Three-foot coal. The greatest thickness exhibited by the bed at DeKoven is 41 inches; the least thickness known is 32 inches. It is a very uncertain coal in the eastern portion of the field.

Coal No. 7, of Owen, which is F of the Ohio county Section, has nowhere been identified as a workable coal, unless the "Lewisport seam," of Hancock county, occupies this horizon (?)

Coals No. 8, of Owen, and E and E*a*, of the Ohio county Section, are not known as workable seams.

Coal No. 9, of Owen (D of the Ohio county Section), is the most regular in bedding, the most constant in thickness (56 inches as a rule), and the freest from "troubles," of any in the field—perhaps, of any in the State. It is, in fact, wonderfully uniform in all respects. Probably 75 per cent. or more of the commercial product of this District is derived from this seam.

Coal No. 10 (C of the Ohio county Section). I was not aware until within recent months that this coal had anywhere been found in workable thickness. It has not been identified as a workable bed in the central and eastern portions of the field, but it has been, and is now being, worked in Union county. At Syers' bank, near DeKoven, the coal ranges from 30 to 36 inches in thickness, usually measuring 34 inches. The last work done at the old Curlew mines was in this coal. As regards the field as a whole, this coal is seldom present, usually showing only as a thin smut; but it has been found presenting a thickness of 30 inches, at the Richmond mines, in Muhlenberg county.

Coal No. 11 (B of the Ohio county Section), ranks next to No. 9 as a source of commercial fuel. It is not a reliable coal, however, since it varies from a soft smutty bed of only 12 inches to a good solid coal (but always with one or two partings), of 7 feet. Its greatest development is, perhaps, in Hopkins county, where it is thick and pretty uniform, though, as in all cases elsewhere, much cut up by clay-slips and disturbed by rolls. The upper part of the bed is occasionally cannel—usually of rather poor quality. This feature has been noted in Muhlenberg and Union counties. Near the Syers bank, in the latter county, mentioned above, the bed is about 33 inches thick, with the following stratification:

a. Cannel	14 to 15 inches.
b. Slaty coal	4 inches.
c. Hard "slate"	10 inches.
d. Clay	
e. Bituminous coal	4 inches.

This coal seems to present its poorest development in Western Union. In the eastern part of the county, especially about Uniontown, it is a valuable coal, excellent in quality, and of admirable thickness.

Coal No. 12 (A of the Ohio county Section), is an excellent coal when well developed, but is seldom found in a suitable condition for mining. When present at all, it varies in thickness from three to six feet, sometimes appearing as a mere smut. Its unreliability is such that no dependence is placed upon it by the miners of this field. It is finely developed at Airdrie, near Paradise, in Muhlenberg county, and is of very excellent quality.

The coal shown above No. 12 in the Reinecke shaft and Madisonville Sections, (Sections 6 and 7 on Plate I), has occasionally been mistaken for No. 12, and was so designated in his Shawneetown, Ill., Section by Dr. Owen. Little is known concerning this coal, or of the other measures above No. 12 coal by the present writer. Part of the section above No. 12 coal may be seen at South Carrollton, Muhlenberg county, and it is quite possible that the rocks in the railroad cut at Rockport, Ohio county, may belong to this part of the Section.

Since the foregoing was written, I have been furnished with the following record of a boring recently put down by the St. Bernard Coal Company, at Earlington, Hopkins county. I am indebted to Mr. Ben. W. Robinson, mining engineer for the company, for a copy of the record, by courtesy of Mr. J. V. Atkinson, Vice-President. The boring, in condensed form, has been put on Plate I. It does not appear to coincide satisfactorily with any Section or boring with which I am acquainted.

[It was hoped, at the time the foregoing was written, that some light might be thrown on this somewhat puzzling, and altogether surprising, boring in this (1893) Report. More definite information on some questions relating to the interior of the coal-field is, however, required. It should be remembered that the writer's efforts to solve the puzzles of the Western coal-field are necessarily intermittent, and limited by duties relating to mine inspections.]

The record, in detail, is as follows:

	Feet.	Inches.
1. Dirt	18	
2. Sandstone	2	
3. Shale	47	
4. *Coal*		8
5. Fire-clay	4	
6. Sandstone and shale	84	
7. Shale	53	7
8. *Coal*		12
9. Fire-clay	2	
10. Sandstone and shale	24	
11. Sandstone—white	20	2
12. Sandstone	11	
13. Dark shale	11	7
14. *Coal*. One inch parting		30
15 Fire-clay	7	6
16. Sandstone	17	
17. Shale	22	
18. Black shale	4	
19. *Coal*		7
20. Fire-clay	9	5
21. Sandy shale	6	
22. White sandstone	58	
23. Sandstone; very coarse and gritty; thin layers of flint; pyrites at bottom	27	
24. Hard, gritty sandstone	8	
25. Shale; full of fossil impressions	4	
26. Sandstone; gritty; some parts very shaly	18	
27. Shale; very black and hard, with thin layers of coal	2	
28. Ferruginous limestone. Full of fossil shells Upper 6 inches very crystalline and very dark	3	6
29. Shale; dark	15	6
30. *Coal*		8
31. Red sandstone. Is very peculiar; crystalline; looking somewhat like a limestone. Contains a few irregular coal impressions. Lower 6 inches looks very much like a limestone	2	
32. Bluish sandstone; very shaly in some parts. Contains some "nigger-heads"	16	10
33. Sandstone	12	
34. *Coal*		1
35. Fire-clay	4	
36. Dark shale	8	
37. Sandstone	3	9
38. Dark shale	8	
39. Sandy shale	5	
40. *Coal*		3
41. Fire-clay—rashy	4	9
42. Dark sandy shale	11	9
43. Dark sandy shale. Is full of broken fossil plants, mostly like blades of grass	13	
44. Dark sandy shale	8	4
45. White sandstone	5	
46. Dark sandy shale	3	
47. Sandstone	17	
48. Dark shale	4	
49. Sandstone	4	
50. Sandstone containing thin layers of coal	7	

	Feet.	Inches.
51. Dark shale with sandstone partings.	18	8
52. Dark shale. Is full of fossil plants. Contains thin layers of coal. Splits very easily	12	
53. Dark shale	14	
54. Bluish sandstone	24	
55. Sandstone with bluish shale intermixed.	24	
Total depth of boring	645	1

The Conglomerate Measures.—Comparatively little is known concerning the conglomerate sandstone series of the Western Field. They present the characteristic variableness and eccentricities—the rapid, often abrupt, thickening and thinning of beds, sudden changes in the nature of the rocks, and the exceeding inconstancy of associated coal beds—that are to be noted in all regions composed of such strata.

Any thing like a particular and accurate study of the series in this Field has been made in only one small district—that portion of the coal area lying within Edmonson and Grayson counties. Mr. P. N. Moore, in his interesting report on that district, separates the region into two parts, with respect to the conglomerates and coals: A region of heavy conglomerate sandstone, principally in the south, where the rocks and coals are especially erratic; and a region of thinner conglomerate and more constant beds, towards the north, included in the space between Bear Creek on the west and the Nolin river and Rock Creek on the east.*

Following is Mr. Moore's General Section, "east of Bear Creek and north of Beaver Dam and Pigeon Creeks, Edmonson and Grayson counties:"

1. Clay shale with nodules of iron ore	35	to	35	feet.
2. Iron ore, reported thickness	1½	to	1½	feet.
3. Clay shale.	30	to	30	feet.
4. Iron ore.	2	to	3½	feet.
5. Space. Probably clay shale	15	to	15	feet.
6. Clay shale	15	to	15	feet.
7. Coal . . . . 8 inches.				
8. "Bee Spring" coarse sandstone. Sometimes a conglomerate. (The "5th Sandstone" of Lyons—Owen's Reports). . .	20	to	60	feet.

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* Report on the Geology of the Nolin River District, etc., Part 2, Vol. II., Geological Survey Reports, N. S. Shaler, Director; 1877.

9. Sandy clay shale	0 to 20 feet.
10. Coal	12 to 24 inches.
11. Shaly sandstone, changing to shale	15 to 20 feet.
12. Space, probably filled with clay shale	15 to 20 feet,
13. Main Nolin coal	24 to 40 inches.
14. Fire-clay and shale	3 to 10 feet.
15. Conglomerate sandstone	15 to 25 feet.
16. Shale	0 to 25 feet.
Top of Chester Group.	

Concerning this, Mr. Moore says: "This section applies very well for most of the region between Nolin river and Bear Creek; also for the region between Bear and Rock Creeks, except at the very edge of the coal measure rocks, where there is some thinning out. It will also answer for a portion of the country east and south of the Nolin river."

Difficulties were encountered, of course, in attempting to obtain a general section for the "heavy conglomerate" region. Only one section of much vertical extent was obtained. This was made at Stevens's coal bank, on Bear Creek, and is as follows:

	Feet.	Inches.
1. Covered, probably sandstone	35	
2. Iron ore		6
3. Shale	3	
4. Coal (reported)		14
5. Covered	5	
6. Sandstone	20	
7. Shale	40	
8. Sandstone	4	
9. Covered, probably shale	18	
10. Coal (Main Nolin)		36
11. Fire-clay	2½	
12. Conglomerate*	50	
Bed of Bear Creek.		

The Main Nolin Coal (sometimes locally known as the "Tar-lick Coal"), is the only known workable bed in the series in this district. It is the equivalent of No. 1 B of Dr. Owen (L of the present writer). It appears here as an inter-conglomerate coal, a fact to be borne in mind when considering the lower coals of Union county. The normal distances of the three coals, shown in the general section, above the Chester lime stone—which is the most trustworthy datum level—are: Main Nolin, 20 to 30 feet; second coal, 60 to 70 feet; third coal, 130 to 140 feet. The prospector among the lower coals of the Western Field will find it well worth while to study Mr. Moore's Report.

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* This rock sometimes thickens to 190 feet.

Very little satisfactory work has been done among the conglomerate beds on the western margin of the coal-field. The following section, made by the present writer in Livingston county, (at the Trabue mine,) and published in his report on the lead region of that and adjoining counties, may be interesting: *

	Feet.
1. Conglomerate sandstone	20
2. Covered (shale?)	5
3. Thin-bedded, slabby sandstone	5
4. Shale	0 to 1½
5. Coal	2½
6. Underclay	4
7. Covered	10
8. Lower conglomerate sandstone; pebbly character, hower, is rare	35
9. Covered to the Ohio river, about	100

At the river the upper Conglomerate exhibits a thickness of 40 to 50 feet, and the lower one shows a thickness of 40 feet. Col. Trabue stated, at the time the section was made, that a coal of 18 inches had been seen just above the upper Conglomerate. The upper Conglomerate becomes thinner in the direction of Carrsville, up the river, while the lower one shows a thickness of 100 feet.

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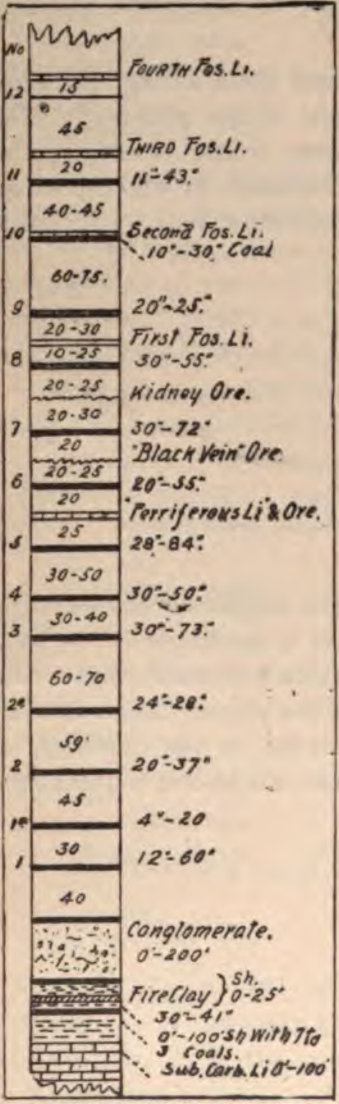
* Part 7, Vol. I, Geological Survey Reports, N. S. Shaler, Director, 1875.

THE EASTERN FIELD.

The Eastern Field, as previously stated, has been divided, with reference to present and future mining, into three Inspection Districts, namely, the Southeastern, the Northeastern, and the Elkhorn.

The Northeastern District. This District includes the counties of Boyd, Breathitt, Carter, Greenup, Johnson, Lawrence, Lee, Magoffin, and Menefee, in which commercial mines are at present in operation; and the counties of Elliott, Estill, Martin, Morgan, Powell, Wolfe, and Rowan.

The accompanying General Section* will serve not only as a key to the coals of this District, but as a type section for the Eastern Field. It is founded on a condensed compilation, with some additions, of the "General Section for Greenup, Boyd, Carter, and a part of Lawrence counties," constructed by Mr. A. R. Crandall, and published in Volume II., Kentucky Geological Survey Reports, N. S. Shaler, Director, 1875. It is subject to modification here and there, in certain parts of the field, especially in the direction of Pine Mountain, but as a type with which comparisons may be made, and upon which other sections may be correlated, it is applicable to the whole field. Compare this Section with the one given in Mr. Hendrie's paper on cannels (in this, 1893, Report) for Flint Ridge, in Breathitt county.



NORTHEASTERN DISTRICT.

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* Scale, 150 feet to the inch.

Correlating the coals of this section with those of Ohio and Pennsylvania, as described in Volume V. (Economic Geology) of Prof. Orton's Ohio Reports, the following synonyms will probably hold good.

No. 1 is regarded as the equivalent of the Jackson Shaft; the Brier Hill; the Block coal of Mahoning Valley, of Ohio; the Sharon coal of Pennsylvania. It is No. 1 of Orton's column.

No. 3, the Peach Orchard and the Turkey Lick coal of this District, is probably the equivalent of No. 3 of Ohio; the Lower Mercer of Pennsylvania.

No. 4, known here as the Hunnewell cannel and as the Chinn's Branch cannel, is probably the equivalent of the Bedford cannel, Orton's No. 4, of Ohio; the Upper Mercer, of Pennsylvania.

No. 5 is probably the equivalent of the Conway coal, Orton's No. 6, of Ohio; the probable equivalent of the Brookville, of Pennsylvania.

No. 6 is the equivalent of the Lower New Lexington, the New Castle, Orton's No. 9, of Ohio; the Lower Kittanning, of Pennsylvania.

No. 7, known here as the Coalton and as the Ashland, is the Sheridan, the Nelsonville, the "Great Vein" of Hocking Valley, the Coshocton coal, Orton's No. 10, of Ohio; the Middle Kittanning, of Pennsylvania.

No. 8 is probably the equivalent of the Steubenville Shaft, the Hatcher coal, Orton's No. 11, of Ohio; the Lower Freeport (Upper Kittanning), of Pennsylvania.

No. 9 is regarded as the equivalent of the Cambridge, the Big Vein of Salineville, the Bayley's Run and Norris coal of Hocking Valley, Orton's No. 12, of Ohio; the Upper Freeport, of Pennsylvania. According to the numbering of Dr. Newberry, this would be No. 7 of Ohio. The Pittsburgh seam occupies the position of No. 8 of Newberry's Section.

Remarks on the Coal-fields of Northeastern Kentucky.

By George Gibbs, Esq.

[Capt. George Gibbs, Superintendent of the Mining Department, etc., of the Eastern Kentucky Railway Company, has kindly prepared the following notes on the coals of this District for this Report.]

The Carboniferous measures of the Appalachian Field cover this territory. The workable veins lie in basins of greater or less extent, separated by barren regions caused by uplifts of the measures. Explorations have not as yet developed the territory to its extent, but it is unquestionably a good field, and must prove of much value in the future, when transportation facilities are secured.

Eleven seams of coal are found; but those numbered 2, 3, 4, 5 and 7 in the reports of the Kentucky Geological Survey are the ones likely to prove of greatest value.

In the region covered by Greenup, Boyd and Carter counties Coal No. 7 (the "Coalton coal") is the principal vein. It is from 3 to 5 feet in thickness, commencing in the hills south of Ashland and running southwest, including the waters of East Fork, Strait Creek, Davy's Run and Dry Fork. It has been extensively mined by the Ashland Coal and Iron Railway Company at Coalton, Rush and Kilgore's; the Norton Iron Works Company, on the Star Furnace property; the Lexington and Carter County Mining Company, on Stinson and Williams Creeks; by the Mary Coal Company and the Strait Creek Coal Company, on Strait Creek and Davy's Run; the Eastern Kentucky Railway Company and the Dry Fork Coal Company, in the vicinity of Willard, on the waters of Dry Fork. The main part of the unworked territory of this seam lies northeast from Willard. Southeast of Willard the measures rise rapidly and the coals disappear.

Coal No. 3* is also worked at several points in this basin, but has not the quantity or value of No. 7.

Coal No. 4† is usually cannel, and is being mined at Hunnewell and on Stinson Creek. It has been opened on Hilton Branch, south of Willard, but not worked to any extent.

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* Known as the "Elkhorn" seam in Pike, Floyd and adjoining counties.—C. J. N.

† Generally known as the "Hunnewell cannel."—C. J. N.

The upheaval south of Willard throws up the conglomerate measures along the upper waters of Little Sandy. Those measures extend across nearly to the Big Sandy Valley, in which the coals again appear, No. 2 showing in the vicinity of Paintsville. That coal underlies a large territory south and east of Paintsville (Johnson county), and is very fine in quality and quantity.

Coal No. 3, worked at Peach Orchard and extending over a large territory south of there, is of value.

Cannel coal, both No. 2, locally so, and No. 4, have fine exposures, and are of good quality in the same direction.

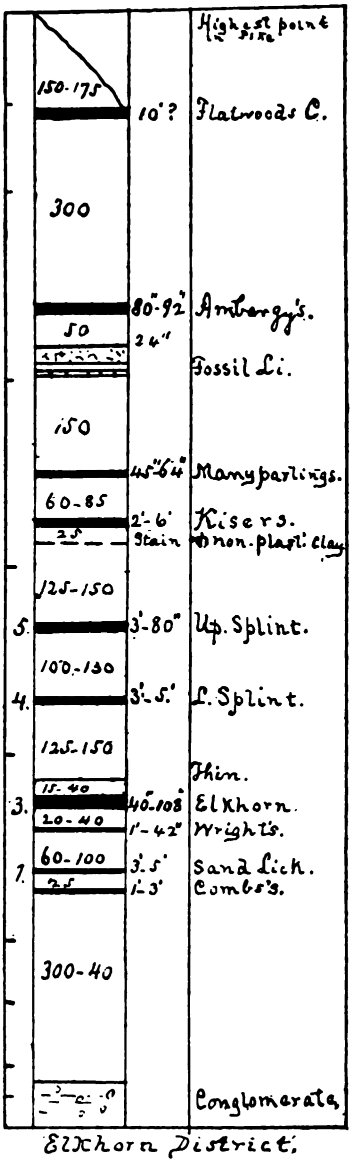
On the waters of Daniel's Creek (Johnson county) and Rockcastle (Martin county) No. 5 shows as a fine vein, 5 to 6 feet in thickness.

Passing south, the valleys of the upper waters of the Big Sandy show fine coking coal, only developed to a small extent, but promising a large field.

Morgan and Magoffin counties, on the waters of Licking river, contain cannel coal which in some localities will prove valuable. The bituminous coal of that section will probably prove of little value, except for local use.

The Elkhorn District.—This District includes Floyd, Knott, Pike and Letcher counties. No commercial mines are in operation within its limits at present, but operations on a large scale are projected for the near future. It is confidently expected that at an early day this District will be one of the most important producers—in some respects the most important coke producer—in the State. Its development is delayed by the fact that a railroad must be built before any considerable work in the way of opening the mines can be undertaken. Arrangements are now under way looking to that end.

The accompanying General Section,* condensed from the report of Mr. A. R. Crandall, on the Pound Gap region, will serve as a guide to the coals of the District. Mr. Craudall gives the following "Provisional General Section" to show "the vertical distribution of workable beds of coal in the Pound Gap region:"



Elkhorn District.

1. Top of highest hills in Pike county.
2. Covered slope, 150 to 175 feet.
3. Flatwoods coal. Reported as a thick bed.
4. Mostly coarse massive sandrock, 300 feet more or less.
5. Ambergy's 80-inch coal. Sycamore creek 92-inch coal. Highest workable seam in Knott county.
6. Shale and sandstone, 50 feet.
7. Thin coal. (Indicated as 24 inches thick in section taken on Ambergy branch of Carr's Fork, in Knott county.—C. J. N.)
8. Sandrock and shale, 25 to 40 feet. Highest rocks in Letcher county north of Pine Mountain.
9. Fossil and bastard limestone horizon. (Shale, 20 feet.)
10. Coarse sandrock, with shale divisions, forming benches, 150 feet.
11. Coal with many partings.
12. Mostly coarse massive sandrock, 60 to 85 feet.
13. Kiser's 6-feet coal, in Letcher. (Bear Fork cannel, in Pike.)
14. Mostly sandrock, 150 to 175 feet.
15. Upper Splint coal, 36 to 80 inches.
16. Shale, shaly sandstone, and sandstone, 100 to 130 feet.
17. Lower Splint Coal, 36 to 60 inches.
18. Mostly sandstone, 125 to 160 feet.
19. Thin coal so far as known.
20. Shales and sandstone, 15 to 40 feet.
21. Elkhorn coal, 40 to 108 inches.
22. Shales, mostly, 20 to 40 feet.
23. Wright's coal, 12 to 42 inches.

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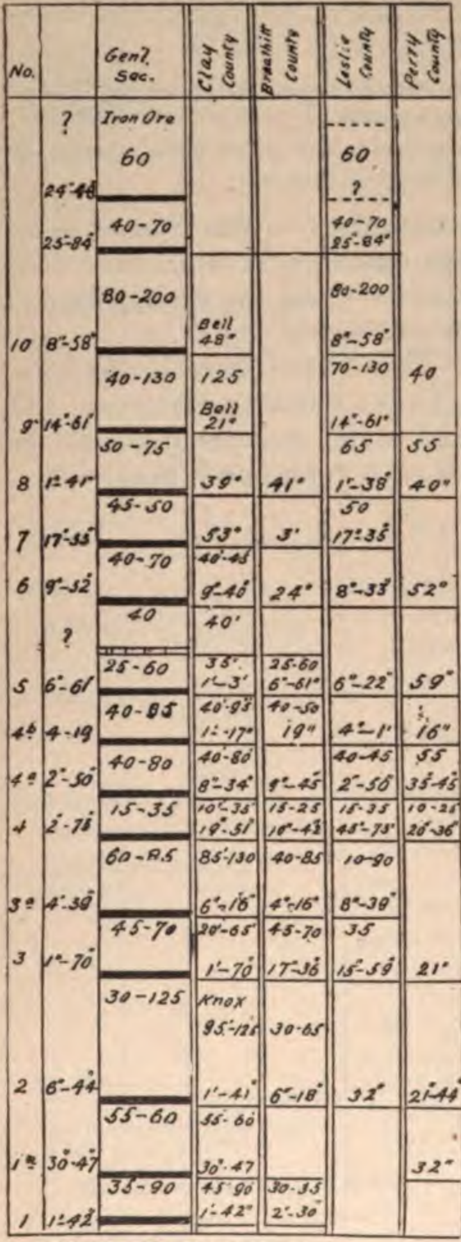
*Scale 300 feet to one inch.

24. Shales, mostly, 50 to 75 feet.
25. Sand Lick coal (No. 1), 36 to 60 inches.
26. Sandstone and shale, 25 feet.
27. Combs's coal, 12 to 36 inches.
28. Shale and sandstone, the latter prominent in places, 300 to 400 feet. Several thin coals; irregular but probably locally workable.
29. Conglomerate formation, divided by shale beds of greater or less thickness into five to seven benches; including several thin coals, 2,000 feet.

The name "Elkhorn" has been given to this District in recognition of the coal—the great excellence of which for coking purposes is now pretty well known—upon the development of which the future of the region will largely depend.

The Southeastern District.—This District includes the counties of Clay, Bell, Laurel, Knox, Pulaski, Rockcastle and Whitley, in which commercial mines are operated, and the counties of Harlan, Jackson, Leslie, Perry and Wayne.



UPPER KY. RIVER REGION.

The accompanying Section of the measures in the region included in the counties of Clay, Leslie, and Perry has been compiled from data given in Mr. J. M. Hodge's report on the geology of the upper Kentucky river. Mr. Hodge gives the following recapitulation of his observations concerning the coals:

"*Sub and inter-conglomerate coals* reach the surface only in southwestern Wolfe and, possibly, Clay counties. So far as found, they are without economic value. (The main sub-conglomerate, or Three Forks coal, is below the surface in the region described.)

"*Coal 1* has a large area developed in Wolfe county and lower Breathitt, on the North Fork, ranging from two to three feet in thickness. It is the least variable of all the beds, is an excellent bituminous coal, with some splint, and promises, unlike its equivalent farther north, to become an important coking coal.

"In Clay county the coal is much used for local consumption on Goose creek, where it is two and a half to three feet thick, but it gives no indication of possessing coking qualities.

"*Coal 1a* is a thin cannel in Wolfe county, without working value. Elsewhere it occurs only as a thin bituminous coal, except on Beech creek, Clay county, where there is about one foot of cannel overlaid by two and a half feet of bituminous coal.

"*Coal 2* is not found as a cannel, and carries but little splint coal. It reaches a thickness of over two and a half feet on Long's creek, where it is an exceptionally fine coal, and will probably become an important working bed along the Middle Fork, in Perry county, where it reaches a thickness of over three and a half feet.

"In Clay county its single thick opening on Left Fork, Goose creek, promises well for that vicinity only.

"*Coal 3*, the 'Elkhorn' coal, is found as a superior coking coal in a thick pocket in Wolfe county. It is found as a cannel coal in Breathitt county, but in thin seams only. An extensive field of coal, three and a half to four and a half feet thick, probably also suited for coking, has been well developed along the North Fork from Bloody creek to Stray branch. Another hardly less important field, with a thickness reaching up to five feet of coal, is found on the Middle Fork extending from below Hyden, Leslie county, nearly to the mouth of Beech Fork. These fields are somewhat interrupted by areas of thin coal, probably small. In Clay county the bed again carries a thin seam of cannel coal, and this can be profitably worked on Left Fork, Goose creek. Evidence is found pointing to the extension of this field as bituminous coal only, through from one fork of Goose creek to the other.

"*Coal 3a* is generally a thin bituminous coal, with occasional pockets of cannel, one of which has been considerably worked near the mouth of Quicksand creek, Breathitt county.

"*Coal 4*, the most important bed, is the 'lower splint' of previous reports, sometimes a cannel coal. In Leslie county, and parts of counties adjoining it, it is conspicuously marked by a persistent thin parting of non-plastic clay, on account of which it is made the base in grouping sections at an assumed elevation of 500 feet. Working seams are found in the southern part of Wolfe county, but they appear to be limited to pockets. Above the mouth of Troublesome creek, Breathitt county, frequent openings show an immense area of coal, varying from two and a half to over seven feet in thickness, and containing pockets of cannel coal of good thickness and quality. Thick deposits are found along the North Fork nearly through to Perry county, and one is believed to extend from the North Fork across Middle Fork—on Ebersole branch and Guy's creek, and down to Squabble creek, where it yields the purest bituminous coal of the region. Another larger, and still more promising field—favorable in the more uniformly thick coal found—extends in Leslie county from Rockhouse creek, up the Middle Fork and Cutshin creek to the points at which the bed disappears below those streams, and nearly the full length of Greasy creek. Of the many openings made in it, scarcely any give a thickness of coal of less than three feet. On the waters of South Fork the coal is generally thin, exceptional thick deposits lying near the heads of Big creek, Leslie county, and Left Fork, Goose creek, Clay county, which are not unlikely to prove of considerable extent.

"*Coal 4a* carries cannel coal over a greater area than any of the other beds, but where of workable thickness the cannel is probably still in pockets. It lies frequently so near Coal 4 that both beds are made more valuable thereby, and it appears that they are sometimes in contact. In lower Breathitt it has been developed as a cannel coal without the discovery of any thick deposit. Its openings of nearly three and four feet, on Grapevine creek and Ebersole branch, North Fork, alone indicate a considerable working field in that part of Perry county; the latter thickness includes eleven inches of cannel coal. Near the head of Middle Fork and on Beech Fork, Leslie county, it again becomes prominent, with over four feet of bituminous coal on the former stream, and thirty-eight inches cannel on the latter.

"*Coal 4b* has been found only in thin seams, though its previous discovery as a thick coal elsewhere leads to the expectation of finding similar deposits in this region.

"*Coal 5*, the 'upper splint,' is another important bed, containing cannel in Wolfe and Breathitt counties. Near the head of Frozen creek, Breathitt county, it is three to three and a half feet thick, part splint and semi-cannel coal, and probably over four feet thick across the hill in Magoffin county. About the mouth of Troublesome creek is an irregular field with coal from three and a half to five feet thick, including the Haddix coal with its three feet of fine cannel. Unusual difficulty in opening the bed has undoubtedly prevented finding much other valuable cannel coal in this vicinity. A five feet opening on Long's creek probably marks the south-western limit of the field. Along the base of Pine Mountain, Harlan county, it is three to four and a half feet thick, slickensides coal, as shown by exposures at the forks of Laurel Fork and of Greasy creek.

"*Coal 6* is frequently in part cannel coal, but as yet has been found with a workable seam of it only on the Middle Fork below Rush creek, Perry county. Scattering openings made in bituminous coal, three to five feet thick, show it to be of some importance; these are on Grapevine creek, Perry county; Beech Fork, Middle Fork, Leslie county; and Katy's creek, Clay county.

"*Coal 7* is of working thickness on the head of Frozen creek, Breathitt county, and over a considerable area about the mouth of Troublesome creek openings have discovered a field, with five feet maximum thickness, which may extend to the Perry county line. Thick coal is found also in Perry county on the North Fork above Rock Lick branch, and on Big creek; and in Clay county, probably on Bullskin creek.

"*Coal 8*, above the mouth of Troublesome creek, is an important cannel bed four feet thick, with about one foot cannel. Along the North Fork, in Perry county, openings indicate a constant thickness of three to five feet. In Leslie county, three feet on Wolfe and White Oak creeks gives some promise of a considerable field there.

"*Coal 9* has but few openings, of which the principal are: Markham branch, North Fork, Breathitt county, three feet; Fish-trap branch, North Fork, Perry county, four and a half feet, and Big creek, Leslie county, five feet.

"*Coal 10* has five feet of coal on Big creek, Perry county, and on Reuben and Oldhouse branches, Beech Fork, Leslie county. Probably an excellent working bed will be developed in Kentucky ridge, in Harlan and Bell counties, and in its northward spurs.

"*Coal 11* has seven feet of coal at the head of White Oak creek, Leslie county, but it has sufficient area for working only on the south side of Greasy creek, where it is five feet thick on Laurel Fork, and three and a half feet on the head of Middle Fork.

"*Coal 12* has been found but has not been investigated."

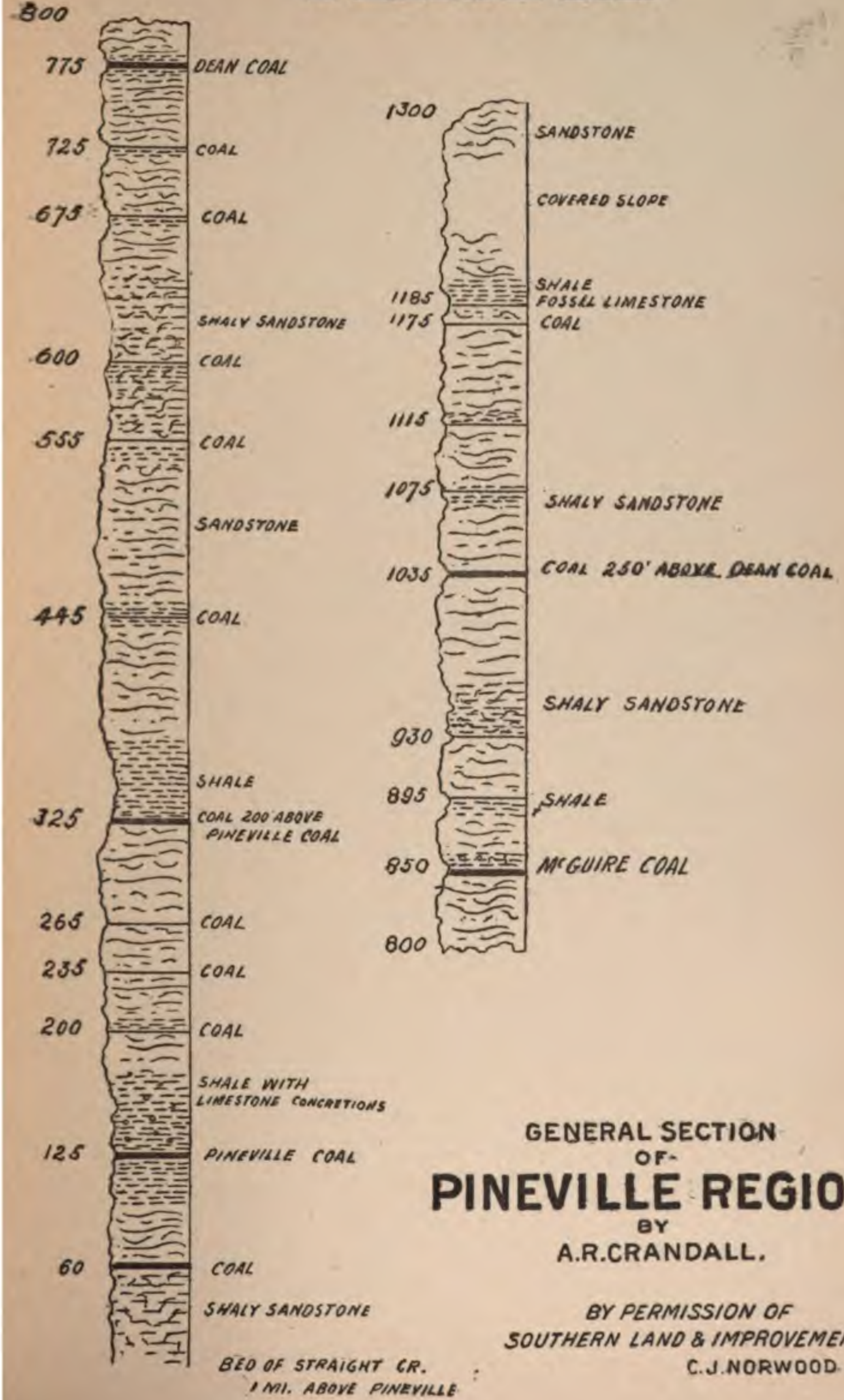
Bell County.—Plate III exhibits the vertical distribution of the coals in the Pineville region, Bell county, north of Pine Mountain. The Section was constructed by Prof. A. R. Crandall, to accompany a report (unpublished) made for the Pine Mountain Coal and Iron Company, 1891, and is published by permission of that company's successor, the Southern Land Improvement Company.

Following are extracts from Mr. Crandall's report, given by permission of Mr. Jno. G. Taylor, Treasurer of the Southern Land Improvement Company:

"The coal-beds of this region are distributed through about 1,200 feet of the coal measures above the conglomerate formation. Several beds of coal, including the Barner seam of the Yellow creek valley, would be found below the drainage and above the conglomerate. Whether any of these are thick enough to be of special interest in this connection is doubtful, from a general knowledge of this portion of the coal-bearing series, though it contains, also, the bed which locally becomes a cannel coal of note, that of the Muddy Branch of Clear creek. . . . . .

"The first workable coal, the 'Pineville seam,' at the base of the hills in the greater part of the region, is the only bed that has been thoroughly tested for special use. It proves, as indicated by analyses, and by its structure and appearance, an excellent fuel, both as coal and coke. In either form its special qualities are based on exceptional freedom from impurities. In the matter of thickness this bed falls below that of the ideal seam, increasing somewhat, relatively, the tonnage cost of mining—a fact which will be more than offset by the special adaptation of the whole product of the mines. . . . . The thickness of this bed increases up the valley of Straight creek, showing an increase from 30 inches on Dorton Branch to 46 inches on Kettle Island creek, where it falls below drainage. Mining this coal on Stewart's branch and near the mouth of

PLATE III.



GENERAL SECTION
OF
PINEVILLE REGION
BY
A.R.CRANDALL.

BY PERMISSION OF
SOUTHERN LAND & IMPROVEMENT CO.
C.J.NORWOOD

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Straight creek is at the disadvantage of taking it at its minimum thickness. So far as examination, and analyses of samples taken from the whole thickness of the bed at points distributed over the district, may determine, this coal retains its special characteristics throughout. . . . Few coals have a higher per cent. of fixed carbon, and yet the per cent. of combustible matters is great enough to make it a free-burning coal, giving it a special value as a steam coal. This characteristic is made possible, to a degree, so far as I have noted, unsurpassed in the practical use, by the low percentage of ash and sulphur, and freedom from phosphorus and other destructive agents." *

[Bed-sections are given of the coal, showing it to range, at different localities above Dorton branch, from 41 inches on Straight creek, near the mouth of Elliott's branch, to 39 inches, on Elliott's branch; 46 inches on Kettle Island creek; 43 inches, exclusive of a parting of 3 inches, on Left Fork of Straight creek: to 38 inches on Caney Fork of Left Fork of Straight creek. The openings at which these measurements were made "are distributed over a large area."]

"Seventy-five feet above the Pineville coal, opposite the mouth of Cope Hollow on Caney Fork, the equivalent of the second Four-mile coal shows 46 inches, including three partings; but as the parts of the bed become too widely separated in this district, generally, to leave it more than a local value, it may be classed with the thin beds of the General Section."

"About 200 feet above the Pineville coal is found the second workable coal of the region. Its extension west from the Left Fork appears to be interrupted by the widening of its parting. As opened above the mines at the Forks of Straight creek, it shows as follows:

[The bed-section given is as follows:

a. Coal	18 inches.	
b. Shale	2 "	6 inches.
c. Coal	2 "	
d. Shale	2 "	
e. Coal	35 "	

---

* The Pineville seam is deemed the equivalent of the "Elkhorn" and "Jellico" beds, No. 3 of the Eastern Field.—C. J. N.

Following is an analysis of the coal:

Moisture	2.20
Volatile combustible matter	34.70
Fixed carbon	58.36
Ash	4.74
	100.00
Sulphur	1.126

"The analysis is from a sample representing both benches of the bed." [Other sections given show thicknesses varying from 37 to 49 inches.]

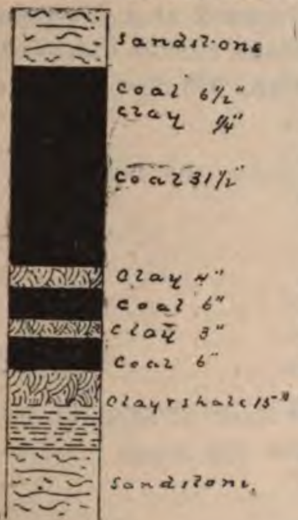
"The area of this bed is considerably less than that of the Pineville seam. But in a large region adjacent to the coking plant above the mouth of Left Fork, it may prove a very important adjunct to the bed below, as it is also a coking coal."

"The third workable coal is known as the Dean coal. It is a good coal, considerably limited in area as a workable bed by irregularity in thickness. . . . . It is the principal bed above the drainage towards the head of the Left Fork. Having a northward dip on the upper Left Fork, it falls below the drainage near the head of that creek."

Following is the bed section of the coal as seen at one exposure on Long Branch, Left Fork of Straight creek:

a. Coal	12	inches.
b. Clay	8	"
c. Coal	8	"
d. Shale	1	"
e. Coal	23	"
f. Sandstone	3	"
g. Clay and streaks of coal	15	"
h. Clay	—	

Analyses of the coal are as follows:



DEAN COAL at Ransom Slushers on Left Fork of Straight Ck

RAMSOM SLUSHER'S COAL:

Moisture	1.40
Volatile combustible matters	37.10
Fixed carbon	56.30
Ash	5.20
Sulphur	1.151

Epperson's Coal, on Symmes' Fork, yields as follows:

Moisture	2.00
Volatile combustible matters	32.80
Fixed carbon	59.98
Ash	5.22
Sulphur	0.601

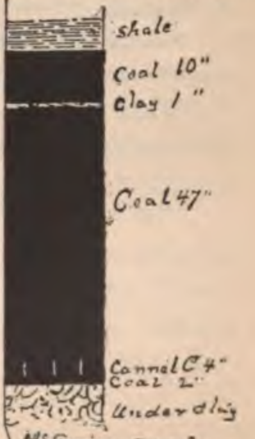
"A characteristic feature of the Dean Coal is a parting of a few inches of non-plastic clay, which is found in this region in two openings only." [This clay may be seen at the horizon of this coal, near the incline of the Breckenridge and Pineville Syndicate, near West Pineville.—C. J. N.]

"Seventy to eighty feet above the Dean coal, a bed, known as the McGuire coal, has been opened at a few points. On the head of Stewart's Branch, at one point, the bed has been faced up to show 64 inches, as in the accompanying cut. * * * In the spur west of Stewart's branch this bed shows 55 inches, 19 inches of which, at the bottom, is a slaty cannel coal."

[Other sections are given, showing thicknesses of 37 and 42 inches, including clay partings. At the cannel mine of the Breckenridge and Pineville Syndicate, Limited, I obtained the following measurements of the bed:

a. Bituminous coal	6	inches.
b. Shaly "mother coal"	2 to 6	"
c. Bituminous coal	34	"
d. Cannel	18	"
Total	64	"

The "mother coal," *b*, is usually from 2 to 3 inches thick. The bituminous, *c*, has a division—but not a "parting"—at 18 inches from the bottom.—*C. J. N.*]



McGuire Coal Hd. of Stewart's Br.

. . . "One hundred and seventy-five feet higher in the series another workable bed has been opened at a few points. It may be seen at the foot of a sandstone cliff at the head of Hoskins Branch of main Straight creek, 975 feet above the mouth of the branch."

A bed-section of the coal (250 feet above the Dean coal, on Straight creek,) is as follows:

a. Coal	1	inch.
b. Bituminous shale	1½	"
c. Coal	14½	"
d. Clay	8	"
e. Coal	21	"

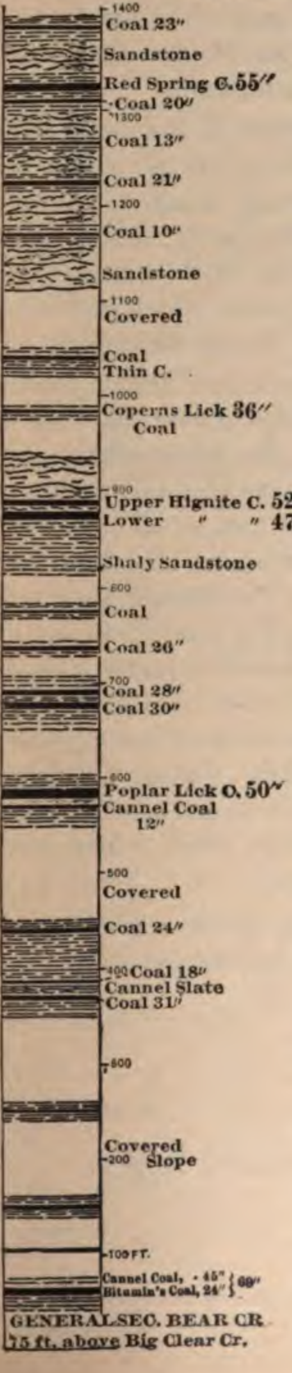
This bed is also opened on the Left Fork of Straight creek, near Ransom Slusher's, 500 feet above the creek, having 41 inches of available coal." * * * * *

The bed section of the coal near Slusher's is as follows:

a. Coal	18	inches.
b. Sandstone	2	"
c. Coal	18½	"
d. Clay	¼	"
e. Coal	4¼	"
f. Bituminous shale	8½	"
g. Coal	6	"
h. Clay	—	"

Following is an analysis of the coal. The "sample for analysis was taken from the whole bed:"

Moisture	1.60
Volatile combustible matter	87.80
Fixed carbon	54 40
Ash	6.20
	100.00
Sulphur	0.860



GENERAL SEC. BEAR CR.
75 ft. above Big Clear Cr.

The accompanying section of the measures in the Bear Creek region of the Log Mountains, in Bell county, south of the Pine Mountain fault, from a special report of Prof. A. R. Crandall to the Log Mountain Coal, Coke and Timber Company, is published by permission of that company, through the courtesy of Mr. F. A. Hull, President. It applies to the Clear Creek regions. An analysis of the cannel bench of the lowest coal shown is as follows, as given in the report in question:

Moisture	1.00
Volatile combustible matters	51.60
Fixed carbon	40.40
Ash	7.00
	100.00
Sulphur	0.739

Prof. Crandall has kindly furnished, for this Report, a copy of his Bryson Mountain Section, which covers the more southerly region of Bell. The section is given with a page-map, showing the location of the principal coal openings. The section begins with the "Ralston coal," which occupies a horizon about 350 to 400 feet above the "Jellico" seam, and it does not, therefore, include the lower coals that outcrop in the vicinity of Middlesborough.

Prof. Crandall says, in a letter accompanying the section:

"The Ralston coal does not occur as a workable bed in the Clear Creek region" [for which a general section has been given *ante*] "or, in fact, anywhere except on Bennett's Fork and southward. The sandstone-parting coal is, perhaps, the best datum level. It is from 200 to 250 feet above the Ralston coal, and is at the base of the Little Clear Creek Section* 175 to 200 feet below the Poplar Lick coal, and 450 to 500 feet below the Lower Hignite coal.

"The double bed of coal near the mouth of Bennett's Fork probably represents the Jellico coal—350 to 400 feet below the Ralston seam. On the Clear Fork waters, south of Bryson Mountain, this coal is more typical in character, rising above the mouth of Valley Creek, and increasing in thickness southward, about 400 feet below the Ralston seam, which is readily identified all along the south spurs from Bryson Mountain.

"In comparing the sections—Clear Creek and Bryson Mountain—I should call your attention to another point: The Poplar Lick coal of the former is a thin bed in the latter section, and the thin bed 30 to 40 feet higher becomes the prominent seam in all the region to the left of Stony Fork as you go up the creek. I have called this bed, which is an excellent coal four feet or more thick, with slight or no parting, the Bryson Mountain seam. It is the Little Coal Gap coal, at the head of Bennett's Fork. This coal, the Ralston and the Lower Hignite, are *the* coals of Bryson Mountain, though others are locally as good, perhaps. I had not quite completed the work of tracing these beds up the Cumberland Valley into Harlan. One more season's work would have carried the thorough development of the Log Mountain beds of Bell to the head of the river, where local changes obscure the section as now known."

Following are the coals and intervening spaces of the Bryson Mountain Section—which is graphically represented on the accompanying plate:

	Feet.	Inches.
1. Slope	60	
2. *Coal and Clay*		15
3. Space	40	
4. *Coal*		79
5. Space	30	
6. *Coal*		39
7. Space	12	
8. *Coal*		8

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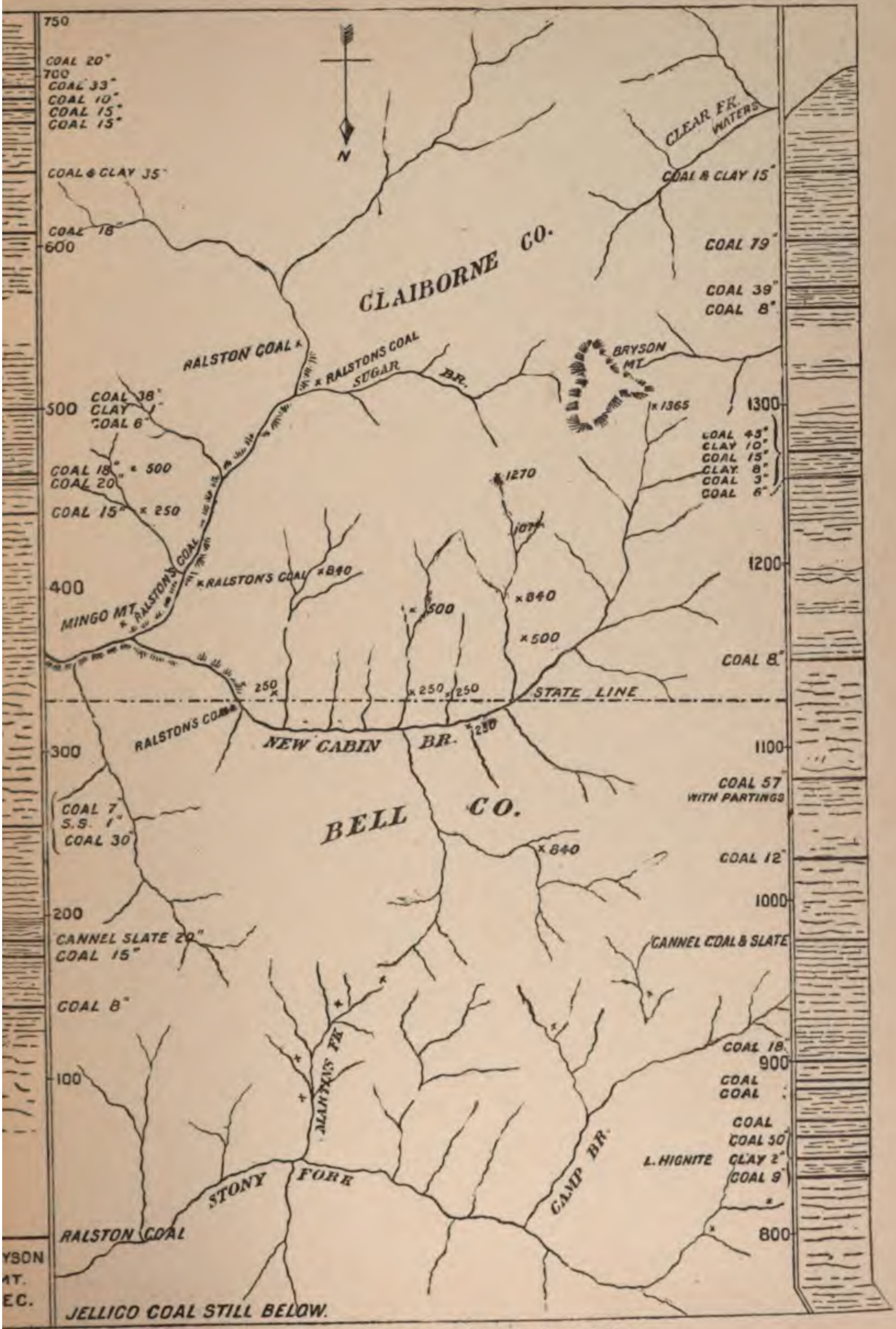
* Being one of the coals, perhaps, near the 400-foot level in the Bear Creek Section *ante*.—C. J. N.



Bryson Mountain Section (A. R. Crandall).

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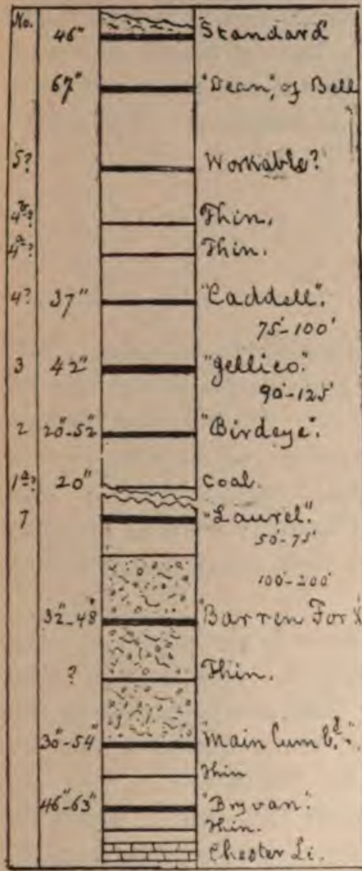
		Feet.	Inches.
9. Space		80	
10. *Coal with two partings*			81
11. Space		20	
12. *Coal*			6
13. Space		100	
14. *Coal*			8
15. Space		70	
16. *Coal with partings*			57
17. Space		44	
18. *Coal*			12
19. Space		44	
20. *Cannel and Slate*			?
21. Space		80	
22. *Coal*			18
23. Space		10	
24. *Coal* (thin).			
25. Space		4	
26. *Coal* (thin).			
27. Space		20	
28. *Coal* (thin).			
29. Space		12	
30. *Coal* (thin).			
31. Space		14	
32. *Lower Hignite Coal.* Divided thus:			
a. Coal	50 inches.		
b. Clay	2 inches.		
c. Coal	9 inches.		
	——		61
33. Space		10	
34. *Coal* (thin).			
35. Space		124	
36. *Coal*			20
37. Space		24	
38. *Coal*			33
39 Space		6	
40. *Coal*			10
41. Space		8	
42. *Coal*			15
43. Space		8	
44. *Coal*			15
45. Space		26	
46. *Clay and Coal*			35
47. Space		40	
48. *Coal*			18
49. Space		110	

50. *Bryson Mountain Coal*, with clay parting, thus:			
a. Coal	38 inches.		
b. Clay	1 inch.		
c. Coal	6 inches.		
	——		45
51. Space		35	
52. *Poplar Lick Coal*, represented by two thin beds, thus:			
a Coal	18 inches.		
b. Space	6 feet.		
c. Coal	20 inches.		
53. Space		20	
54. *Coal*			15
55. Space		190	
56. *Coal, with sandstone parting thus:*			
a. Coal	7 inches.		
b. Sandstone	1 inch.		
c. Coal	30 inches.		
	——		38
57. Space		70	
58. *Cannel Slate*			20
59. Space		8 or 10	
60. *Coal*			15
61. Space		22 or 24	
62. *Coal*			8
63. Space, about		104	

64. *Ralston Coal.* (At Ralston mine, reported 72 inches.)



1 Inch = 300 ft.
Whitley & Pulaski.

The accompanying diagrammatic profile section, from the report of Mr. A. M. Hodge on the counties of Letcher, Perry, etc., will serve to indicate the general disposition of the beds in and between the Pine and Cumberland Mountains.

[A section intended to show the outcropping coals in Mingo Mountain, prepared by Mr. John Ralston, of Middlesborough, was given in this chapter as originally published. It does not coincide with the section given by Mr. Crandall, however, with respect to either the thicknesses of the coals or the intervals between the beds. It is deemed best, therefore, to omit it.]

The accompanying condensed section for Whitley and Pulaski counties has been compiled from the sections presented in Prof. A. R. Crandall's report on those counties. The three sandstones shown below the Laurel coal are the "Conglomerates" of the "Rockcastle Series." Following are extracts from the report in question:

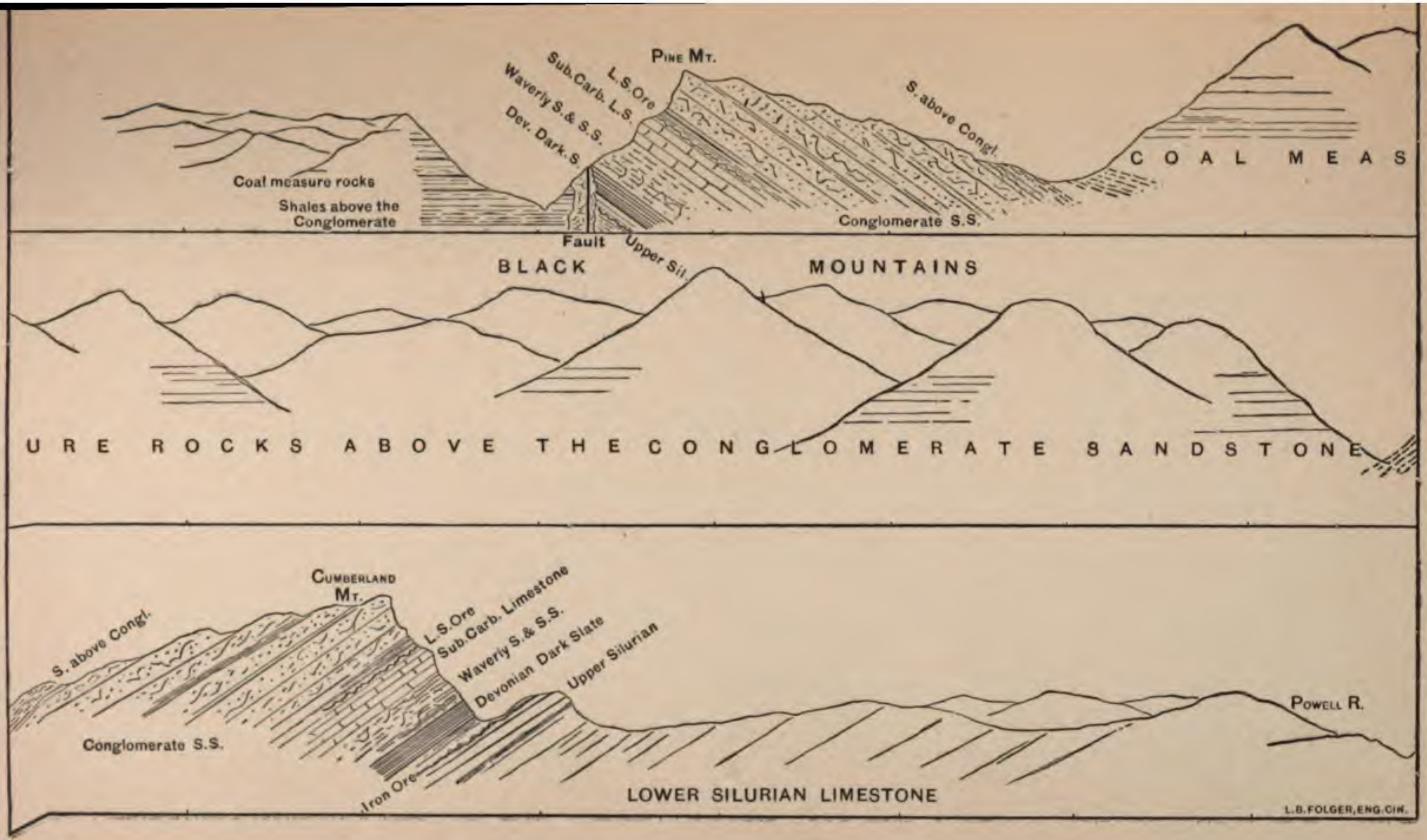
"The thin coal near the top of the Chester group is interesting as occurring at a coal level of some economic importance in Jackson county—the Jackson county cannel horizon. It is shown in the Happy Hollow region under the first prominent sandstone ledge." The Bryvan coal "is the most prominent bed in the South Fork region. It has been opened at a number of places both in Whitley and in Pulaski; rising to the westward, it should be the most widely distributed bed in Wayne county." The thickness of the coal "varies from 46 to 63 inches in one body." "Preliminary tests of the coking quality of the Worley branch (Bryvan) coal resulted favorably, as will be seen by the analysis of the coke, which is described by Dr. Peter as a firm and compact coke. The favorable result of these tests is the more interesting, as this bed is supposed to be the equivalent of the Pocahontas coal of Virginia." The analysis of the coke is given as follows:

Moisture	2.10
Fixed carbon	90.46
Ash	7.44
Sulphur	0.665

"The Happy Hollow coal, on the Cincinnati Southern Railway, 50 to 60 feet above the top of the Chester group, has 39 inches of good marketable coal. . . . In the Cumberland and Rockcastle river region this seam is represented by the 'Lower Coal' of the 'Cumberland Coal' region. . . . The lower coal is about 60 feet above the Chester shales, as noted at the Edwards mines, three-fourths of a mile below the mouth of the Rockcastle river."

"The next workable coal in the Series is also found in both the South Fork and the Rockcastle region. It is from 70 to 90 feet above the seam just described. This bed is opened on the Worley and Stover branches of the South Fork, 44 and 37 inches respectively, as measured by Mr. Thruston. . . . In the Cumberland and Rockcastle region this bed is the main coal. . . . Rayburn's 'Slip up mine,' on the great bend of the Cumberland river, is the only place visited where mining is now carried on in this district at this coal horizon." [Bed-sections are given which show thicknesses of the coal ranging from 40 to 54 inches.]

"The third workable coal seam of this group is the Barren Fork, Flat Rock, Greenwood, Beaver creek seam, about 200 feet higher up in the formation." [Bed-sections are given showing thicknesses of 32 to 36 inches of solid coal, and of 38 to 46 inches of coal exclusive of partings.] "This bed would doubtless be found at its proper outcrop level in the South Fork valley, in Whitley county, 200 feet or more below the grade of the Cincinnati Southern Railroad. . . . . Above this coal level follows a conglomerate sand-rock from 100 to 200 feet in thick-


Pine Mt.
L.S.Ore
Sub.Carb. L.S.
Waverly S.& S.S.
Dev. Dark.S
S. above Congl.
Coal measure rocks
Shales above the Conglomerate
Conglomerate S.S.
COAL MEAS
Fault
Upper Sil.
BLACK
MOUNTAINS
URE ROCKS ABOVE THE CONGLOMERATE SANDSTONE
Cumberland Mt.
S. above Congl.
L.S.Ore
Sub.Carb. Limestone
Waverly S.& S.S.
Devonian Dark Slate
Upper Silurian
Conglomerate S.S.
Iron Ore
LOWER SILURIAN LIMESTONE
Powell R.
L.B.FOLGER,ENG.CIN.

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ness. This is removed in part or entirely over a considerable part of this field. It is most prominent towards the Tennessee line, forming the rock tables southward from Flat Rock station."

In regard to the "Laurel" coal, which is No. 1 of the Eastern Field, and is shown on the section just given, Mr. Crandall says: "In Whitley county it has not been opened in such relation to the top of the conglomerate measures as to give it a definite relation to that formation. In Laurel it is from 50 to 75 feet above the conglomerate." . . . . "Of the coals in the measures above the conglomerate division, the bed known as the Jellico seam is the most important. . . . . In the series above the Rockcastle group this coal is the third workable bed. Counting all the seams which may have local value, the Jellico seam would be the fourth or fifth in the series . . . In its relation to the topography of the hill region to which it is here limited, it ranges from 200 to 400 feet above the main water-courses. In bed-section it has a thickness varying from 30 inches to 62, generally separated into two benches by a thin clay parting, which is reduced in its northward extension to a mere trace, or replaced by a thin parting near the base of the bed. [This clay "parting" is sometimes 22 feet thick.—C. J. N.] In this region this bed is exceptionally persistent in its structural characteristics, as it is also in its composition, being unusually free from excess of ash and sulphur throughout."

"Below the Jellico seam, 100 to 125 feet, in a portion of the Whitley region, is a bed which will find a ready demand from its free burning qualities. It is known as the Birdseye coal, from the peculiar pitted fracture which it exhibits in unusual perfection." [The thickness of the coal ranges from 20 to 52 or more inches.]

"From 75 to 100 feet above the Jellico seam a bed of considerable importance has been noted at a few points. The Caddell seam, in the ridge between the forks of Wolf creek, which is at this level, shows a thickness of 37 inches. It approaches a cannel coal in composition, being a free-burning coal."

The coal indicated in the section at a level about 200 feet above the Caddell seam, "though not proven to be a workable bed in thickness, is sufficiently prominent to lead to the expec-

In neither Laurel nor Pulaski were any thick beds penetrated by the drill; but, as has already been suggested, the evidence afforded by a drill-hole as to the thickness of a coal bed is applicable only to the ground immediately about the hole. A single drill-hole, therefore, may prove misleading.

In Menefee county the Conglomerate Series, as developed in the northern part of this (Eastern) coal-field, may be studied. From one to four coals occur below the main Conglomerate there. It is seldom that all the coals are present. Frequently only one bed is present; this, known as the Main Coal, is the one occurring first below the Conglomerate.

In the Southeastern District nearly all the product is derived from two beds, No. 1 (the Laurel coal) and No. 3 (the Jellico and Pineville seams). Other coals worked are No. 3*a*(?); No. 1*a*(?) or No. 2; an inter-conglomerate (at Barren Fork and Greenwood); a sub conglomerate (at Alpine—the "Happy Hollow"); and the McGuire cannel.

IX.

NOTES ON THE CANNEL COALS OF KENTUCKY.

In the investigation and development of the mineral resources of Kentucky, no branch of her varied mineral wealth has excited so much interest or caused so much disappointment as the deposits of cannel coal, found within her borders. The disappointment has been caused by the fact that a close and careful investigation invariably demonstrates the limited area of these deposits and their unfailing "pockety" character. During the period of inflation, dating from 1889, this was especially noticeable in Eastern Kentucky, where numerous cannel coal companies were formed and land purchased on the strength of [illegible] two crop openings. Investigation following *after* the [illegible]se, only a fractional portion of the total area was found to carry cannel of a workable nature. In one instance, which came under the notice of the writer, during this period, one company purchased six thousand acres of land, supposed by the sanguine investors to be practically underlaid with a rich cannel bed. A close investigation showed at a later period an area of possibly three hundred acres, carrying cannel, mostly thin. The President of this company claimed to prospective investors that they had thirteen square miles of cannel. This land was practically purchased upon the appearance of one opening.

The most valuable deposits of cannel coal are found in England, Scotland, Australia, and, in the United States, in Kentucky. The English deposits are larger in area, and much more regular in formation than those found in Kentucky, and, as domestic coals, they are superior in quality, but in value, for gas-enriching purposes, will not average with the higher grades of Kentucky Cannel. The Scotch Cannels, on the other hand, bear a closer resemblance to those of Kentucky, in their smaller deposits and richer quality. These foreign cannels are, however, being rapidly, if not now practically, exhausted. The Australian deposit at Wollongong, which, more properly speaking, is a shale, and very limited in area, is remarkably rich, and as a gas enricher was probably unsurpassed, with the exception of the celebrated Boghead deposit found in Scotland, and now long since exhausted. This last mentioned deposit maintained the well known pockety and uncertain character of cannel coals by its exceedingly limited quantity both in area and thickness.

The value of a cannel coal, apart from its use as a cheerful and luxurious grate and domestic coal, is based upon its richness and purity as an enricher for gas-making purposes, together with the product or residue left, such as coke, after the volatile matters have been driven off, purified and stored in the gasometer. It is to this market that the highest grade of Kentucky Cannels will find their way. Of the extent and broadness of this market, some facts will be stated later.

Breathitt county has acquired the reputation of having the largest and best quality of cannel coal in the State. This reputation, however, examination does not altogether verify. Within the county limits, however, some excellent showings of cannel coal are found. Probably the well known Haddix Cannel Coal is best known. This pocket is situated at the mouth of Troublesome creek, about nine miles above Jackson, on the North Fork of the Kentucky river. This coal, No. 5 of the State Geological Survey, crops about 250 feet above the river, and, at the mouth of the best opening, shows the following section:

Shale	12"
Coal	14"
Bony Coal	12"
Cannel Coal	21"

The bottom portion of this cannel coal, the exact thickness of which could not be clearly defined, owing to water, at time of examination, is a slick, bright cannel, showing the following analysis by the Consolidated Gas Company, of New York:

Volatile combustible matters	60.60
Fixed Carbon	30.40
Ash	9.00
	100.00

The upper portion of the block is more of a bird-eye character, of rough appearance, and makes a splendid domestic coal.

This coal was boated down the Kentucky river in former years, and acquired a high reputation. An entry has been driven through the hill in this bed to the Rye Cove Branch, on the opposite side of the hill, a distance of probably three hundred yards only. On the river side the coal is not found with any thickness, except close to the main opening, indicating a close and limited pocket. On the Rye Cove Branch side, a small tributary of the North Fork of the Kentucky river, a number of openings have been made. One opening, a hundred yards above the mouth of the main entry, shows the following section on the crop:

Coal	6"
Cannel Coal (soft)	28"

At a point still higher up, on same side, the coal has gone down to 20" thick, and no cannel. On the opposite, or north side of the Rye Cove, an opening near the head shows but 18" of bituminous coal. Coming further down on the same side, another opening, about opposite the main entry, shows 37″ of clean, hard, bituminous coal, without any appearance of cannel, although only three hundred and fifty feet from the mouth of the main entry, which shows an excellent cannel block. However, at a point several hundred yards further down the Branch, a heavy deposit of cannel comes in, showing at one opening the following bed-section:

Coal	10″
Cannel Coal	35″

How far this area of thick coal extends it is impossible to say. An opening a few hundred yards below indicates an absence of cannel and a thinning of the bituminous coal. A persistent effort made to find this bed in the next little ravine, called Garden Hollow, showed the following results: One opening near the head of the Hollow produced 10½″ of slaty coal, and another opening on the south side showed 13″ of semi-cannel. Proceeding further round to the head of the next branch, known as Garden Hollow, 23½″ of bituminous coal was found. I estimate the acreage of workable cannel in this pocket at fifty acres, with an average thickness of 20 inches. An effort to find this bed in the next creek, proceeding down the river, resulted in the opening of the bed in Ford branch, at the head of which the following section was obtained:

Coal	24″
Semi-Cannel	7

The bituminous coal here is a beautiful splint coal, of excellent quality. Other openings on this branch in the same bed showed a bituminous coal of good quality, averaging under three feet in thickness. On the river, near the old Haddix opening, and one hundred and twenty feet below No. 5 bed, designated in the Geolgical Reports as No. 4 coal, we find a bed, which is the most frequent cannel-bearing bed in this territory, and in the eastern part of the State. At this point, however, the bed is thin, as the following section shows:

Slaty coal	6″
Cannel Coal	6½″

The next large deposit of cannel coal found, proceeding up the North Fork, is on George's Branch, a creek coming in on the north side of the river, five miles above the Haddix mines, and about fifteen miles above Jackson, the present terminus of the Kentucky Union Railway. This deposit is found in No. 4 coal, and is one of the most important in the State, owing to its excellent quality as a high grade gas enricher, and also owing to the area of the deposit. The cannel crops about one hundred and forty feet above the bed of the river, and from the mouth of the creek to a point a mile and a half up, the cannel shows a persistent and regular outcrop. Numerous old openings and dumps on both sides indicate that a large tonnage was shipped down the river in the past, to the lower markets on the Kentucky river, where the coal earned an excellent reputation as a domestic coal. At an opening about half a mile up the branch, on the north side of the stream, on the lands of the George's Branch Cannel Company, the coal is found as follows:

Shale Roof:

Coal	12"
Splint Coal	8"
Cannel Coal	18"

The bituminous coal on top is of fair quality. The cannel, however, is a beautiful, clean, bright cannel coal, tough and elastic. Another opening on the Stone Coal Fork, a small tributary of George's Branch, and about half a mile from its mouth, at a point where the coal goes below drainage, a somewhat similar section is found:

Coal	17"
Cannel Coal	18½"

Proceeding one-half-mile further up the main creek, a similar thickness is found, the quality invariably excellent. At an opening made on the river, about a mile above the mouth of the branch, the coal has passed into a slaty cannel and thin, evidencing a passage from a cannel to a bituminous. A similar result is found at a point on the Lick Branch, a small tributary below the mouth of George's Branch, and possibly two miles across in a straight line. On Wolf Creek, the next watercourse above George's Branch, on the same side of the river, the coal crops on the side next George's Branch thin, and apparently a semi-cannel. On the south side of the branch, however, a heavy outcropping is found in this bed, where it obtains an unusual thickness, as the following section will show:

Shaly Sandstone:

Coal	6"
Coal	30"
Slate	1"
Coal	13"
Cannel Coal	23"

The cannel coal in this bed is similar in appearance and quality to the upper portion of the Haddix cannel block. At a point one-fourth of a mile further up the creek, the coal passes below drainage, its thickness going down to about four feet, indicating the extremely limited nature of the pocket of thick coal. I estimate that this deposit will carry at least three hundred and seventy-five acres of workable cannel, after allowing for the large area cut out by the water-courses, as is usual in this territory. Thus, this deposit shows itself to be one of the most important in the State. The bed has ample cover for mining. Mr. James Heron, formerly Mine Superintendent of the Breckenridge Cannel Coal Company, and later of the Lexington and Carter County Coal Company, and one of the most experienced and practical authorities on cannel in this country, who examined this property, stated that "with Breckenridge out of the way, which it must be very soon, the cannel in George's branch will be left with few equals." The analytical examination of this coal is interesting, as will be seen:

ANALYSIS BY DR. ROBERT PETER FROM SAMPLE TAKEN FROM FACE OF ENTRY 120 FEET IN.

Composition air dried.	
Hygroscopic moisture	0.50
Volatile combustible matters	58.02
Coke	41.48
	100.00
Percentage of ash	7.48
Carbon in the coke	84.00
Percentage of sulphur	1.098
Character of the coke	Friable.
Color of the ash	Dark Grey.

ANALYSIS BY CONSOLIDATED GAS COMPANY, NEW YORK.

Volatile matter	61.9
Fixed carbon	33.7
Ash	4.4
	100.00

ANOTHER ANALYSIS AND GAS TEST IN CAR LOAD LOT YIELDED:

Volatile matter	54.00
Fixed carbon	34.40
Ash	10.90
Moisture	.70
	100.00

11,578 cubic feet of 50.4 candle gas. Purification 3.820 cubic feet to bushel of lime 583,279 candle feet.

REPORT OF SAMPLE OF GEORGE'S BRANCH KENTUCKY CANNEL COAL RECEIVED LIVERPOOL APRIL 11TH, 1892.

PRACTICAL RESULTS.

Purified gas per ton of coal, corrected volume	13.303 cubic feet.
Average illuminating power of gas burned at the rate of 5 cubic feet per hour by London Standard Cannel Burner	31.15 Sperm Candles (corrected).
Coke per ton of coal	937 pounds.
Ash in the coke	11.4 per cent.
Ash in the coal	6.0 " "
Sulphuretted hydrogen in foul gas	1.0 " "
Carbonic acid, CO in foul gas	2.8 " "
Value of gas from one ton of coal in sperm	1,420 pounds.
Specific gravity of the coal	1,350.

ANALYSIS OF THE COAL.

Volatile matter	50.00 per cent.
Coke (carbon)	44.00 " "
Ash	6.00 " "

A portion of this cannel gave the following results, viz:

13,822 cubic feet of purified gas per ton corrected volume of 32.70 Sperm Candles by London Standard Test.

This is a very first-class and clean cannel coal, yielding a large volume of gas of high illuminating power. The coke is an excellent fuel, and would be readily salable. The amount of impurities in the coal is below the average of Scotch Cannels.

ALFRED KITT, *Asso. Mem. Inst. C. E.*

WORLD'S COLUMBIAN EXPOSITION—DEPARTMENT OF MINES, MINING AND METALLURGY.

CHICAGO, ILL., U. S. A., Oct. 31, 1893.

This certifies that I have analyzed a sample of coal furnished by the Department Coal and Iron Expert under No. 370, with the following results:

Sample of coal No. 370, record No. 151, furnished by the George's Branch Cannel Coal Company, Breathitt county, Kentucky.

Water	1.20
Volatile matter	64.69
Fixed carbon	29.24
Sulphur	.82
Phosphorus	. .
Ash	4.05

D. C. BOYCE,
Expert Coal and Iron.

J. S. CARY,
Chemist in Charge.

The analysis and gas test made by Mr. Kitt, a standard authority, was made from car load samples and from coal that had been on the dump and exposed for over a year. It proves the coal to be a high grade gas enricher. This coal obtained an award at the late Columbian Exposition at Chicago.

About ten miles distant from the George's Branch deposit, and on the waters of Troublesome Creek, an important tributary of the Kentucky river, and twenty-one miles distant from Jackson, the county seat of Breathitt county, another deposit of cannel coal is found of considerable area and good quality. This deposit is interesting as showing, from the amount of prospecting done, the point at which the cannel gradually passes from cannel to a bituminous coal. This body of cannel is situated at the head and on the smaller forks of Noble's Branch, a tributary of Troublesome. Passing over the headwaters of Noble's Branch, on the other side of the divide, we find the waters of the Cockerill Fork of Lost Creek. This is another important tributary of the Kentucky river, although it empties itself into Troublesome Creek, a little above its mouth. The topography of the field is generally hilly, and broken up by numerous small branches or drains, as they are termed locally. The high points on the top of the main divide will rise above the bed of the large streams from six hundred to seven hundred feet. The bed of cannel coal crops out on both sides of Noble's Branch and its smaller tributaries at a height of one hundred and thirty to one hundred and forty feet above the bed of Troublesome Creek. This bed is No. 4 of the geological series. Beginning at a point where the first opening is found, near the head of Noble's Branch, the following section is found:

Coal	11"
Cannel coal	23"

The bituminous coal on top is of good quality. Following the line of the outcrop, about a quarter of a mile, in a direction leading to the mouth of Branch, another opening shows as follows:

Coal	10"
Cannel coal	21"

Proceeding with the outcrop still further in the same direction for about half a mile, the next opening is found showing:

Coal	10½"
Cannel coal	21½"

About a quarter of a mile further, in a small hollow, the coal thickens slightly to the following:

Coal	11"
Cannel coal	25"

This was a badly weathered outcrop, but the block was perfectly sound. Proceeding still further round with the line of the outcrop to a point four hundred yards beyond, the bed again is found as follows:

Coal	8"
Cannel coal	24"

Crossing over a small divide on to the waters of another small fork of Nobles Branch, known locally as the P. D. Branch, the coal begins to show a change in character and section, as will be seen from the appearance of the next opening half a mile beyond the preceding one:

Coal	9"
Cannel	7"
Coal	10"

At the head of this branch, half a mile above the preceding opening, the bed shows:

Coal	7"
Cannel	1' 8"

From the last two sections it will be seen, that at some point above, the northern boundary of the cannel coal bearing area has been reached, and the rapidly changing character of the coal again demonstrates the pockety nature of all cannel coals. At the head of this branch, and twenty feet below the bed described above, another bed is found with the following section:

Coal	11"
Bird-eye Cannel	27"

This Bird-eye Cannel is a very beautiful coal, and of excellent quality. The Bird-eye Cannel in the bottom portion of the bed bears a close resemblance in fracture and general appearance to the celebrated Bird-eye Cannel of Whitley county, Kentucky, alluded to in succeeding pages. Another opening in this same bed, on a small fork of Troublesome, in a northerly direction, and three-fourths of a mile distant from the last opening, shows as follows:

Coal	18"
Bird-eye Cannel	16"

Going back again to the first opening in the No. 4 coal, and passing over the head of Noble's Branch, and descending towards Cockerill's Forks, no openings are found that could be measured, but heavy outcroppings of cannel coal were found in the position of the bed, some of the blocks being quite sound and large. The distance from the outcrop of the cannel on the head of Noble's Branch through the mountain in the bed to Cockerill's Fork, will be about three-quarters of a mile. On the Cockerill's Fork side, this coal is found as a bituminous bed 22" thick, with bony coal; but at what point the change takes place in the character of the coal, it is impossible to say, entry driving alone being able to determine that. There is unquestionably a large deposit of workable coal. This cannel is of good quality. An analysis made by Dr. Peter of a badly weathered outcrop sample, taken from the second opening mentioned, shows the following:

Moisture	1.40
Volatile combustible matter	50.62
Fixed carbon	36.78
Ash	11.30

The ash runs somewhat high, but the condition of the sample would to some extent account for this. On Cockerill's Fork, near John Noble's house, No. 5 coal, the equivalent of the Haddix coal alluded to before, is found in the following condition:

Coal (bony)	1' 7"
Cannel (slaty)	1' 6"
Slate	1' 2"
Coal (bony)	2' 9"

On a small branch, on the right hand side of the main creek, the coal shows again:

Coal	8"
Slate	8"
Coal	18"
Cannel coal	15"
Coal (soft)	2"

On the left hand side of same creek, another opening shows:

Coal	25"
Semi-cannel	12"
Coal	36"
Clay parting	12"
Coal stain	6"

On another opening, a quarter of a mile above, we find:

Coal	24"
Slate	4"
Block Coal	10"
Bony Cannel	4½"
Coal Stain	

The cannel found in the first opening is an excellent coal, somewhat resembling the cannel coal at the Haddix mine. There is a large deposit of coal in this bed here, but as can be gathered from the sections, it can hardly be classed as workable under existing conditions.

Probably the next most interesting body of cannel coal in this county is on the waters of Quicksand Creek, one of the largest streams which join the North Fork of the Kentucky river, about four miles above Jackson. This deposit of cannel is found on the South Fork of Quicksand, about ten miles above Jackson, on the south side of the river. On the Henry Williams farm, now the property of the Dictator Cannel Coal Company, and on Leatherwood Branch, a considerable prong of

South Quicksand, about half a mile from its mouth, the cannel coal crops at an elevation of one hundred and forty feet above the bed of the creek, with the following section:

Coal, mainly splint	24"
Slate	11"
Cannel Coal	21"
Blue Slate	48"

This bed is again No. 4 of the geological series, and the cannel is of excellent quality, showing that it contains over 66 per cent. of volatile matters, and running low in ash. The cannel is bright and slick in appearance, and ignites readily with a match. At a point half a mile further up, but on opposite side of the same fork, another opening in this same bed shows as follows:

Coal	20"
Cannel	12½"

In this opening, the cannel is again of excellent quality. Crossing over the hill from the first opening south to the waters of Fugate's Fork, the bed is found as a thin bituminous coal, with an entire absence of cannel, indicating a closely limited pocket. Going up South Fork, three-fourths of a mile from the mouth of Leatherwood Creek, this bed is again exposed in an outcrop, opening with a slightly different section:

Coal	23"
Slate	7½"
Cannel Coal	18"

At an opening on the opposite side of the creek, in a small branch, the bed again shows:

Coal	24"
Slate	8"
Cannel Coal	18"

On the Wilson Fugate's branch, still higher up on South Quicksand, another opening shows:

Coal, mainly splint	2' 6"
Slate	1' 0"
Cannel block	1' 8"

On the John Clemmons farm, the following section was found:

Coal	5"
Cannel coal	6"
Coal	8"
Cannel coal	6"
Coal	1' 2"

Twenty feet higher, and immediately above the last opening, another bed is found, an iron ore of considerable thickness forming the roof, in a regular stratified form:

Iron ore.	
Coal	1' 4"
Slate	5"
Cannel	1' 0"

The exact identity of these two beds is not determined, but the first one alluded to is probably No. 4 coal, although the section of the second coal might indicate otherwise. In this pocket an area, even if somewhat disconnected, of three hundred acres of workable cannel will be obtained, although the indications point to a thin bed. This cannel is one of the best quality that the writer has found in Breathitt county. An analysis by Professor Egleston, of Columbia College, gives the following excellent results from sample taken from the Henry Williams bank:

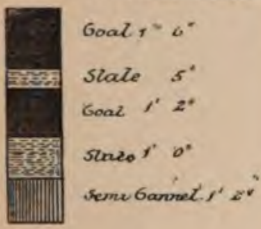
Water	0,35
Volatile combustion	66 28
Fixed carbon	29 73
Ash	3 64
	100.00

In this vicinity No. 5 coal is found, but invariably badly broken up with slate partings, as the following sections will show on accompanying page:

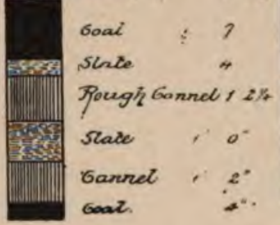
These sections give a fair representation of this bed in this territory. Under present conditions, the coal can not be classed as workable, although the cannel, as a rule, is of good quality. At the head of Leatherwood and Russell Creeks, the mountain rises to a height high enough to carry all the coals up to, and including No. 10 of the geological series. The area of coal contained in these upper beds is, however, so limited, and the quality so poor, added to their inaccessibility, as to render them of no commercial value. This mountain, known as Flint Ridge, takes its name from a peculiar deposit of flint, about thirty-five feet thick near the top. It is one of the highest points in Breathitt county, and the only one which attains a height sufficient to carry these coals. For this reason the section and bed

Sections Showing No 5 Bed in Breathitt Co.

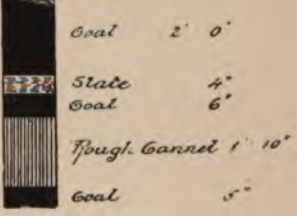
Henry Williams So. Quicksand



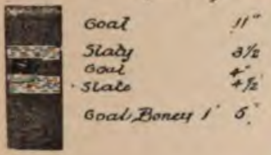
Schoolhouse Br.



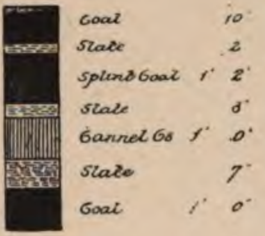
Fugates Br.



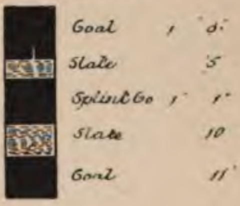
Head of Leatherwood at George Millers House



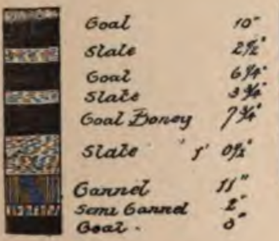
Alfred Fugates. Two Mile Creek



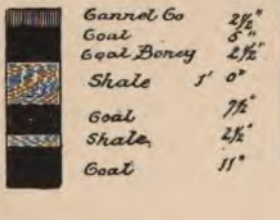
MacIntosh Farm South Quicksand



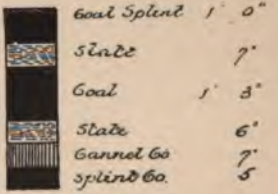
Wilson Fugates So Quicksand



Dan. Williams



Russell Branch



sections will prove interesting, as showing over five hundred feet of strata in one of the most interesting portions of the Eastern Kentucky coal field.

Near the mouth of Quicksand Creek, cannel is found, but thin, and extremely limited in area. Within a mile of Jackson, on the north bank of the river, on the Joe Little farm, a remarkable deposit of cannel coal is found in No. 4, on a high knob. The cannel bed is thin, with only a covering of from ten to fifty feet, and caps the knob, running in thickness from ten to sixteen inches, with a thin bituminous parting on top. This cannel is remarkable, owing to its quality, as the following analysis, made by the Consolidated Gas Company, of New York, will show:

Volatile matters	68.0
Fixed carbon	28.2
Ash	3.8
	100.00

This coal has a bright, slick, satiny appearance, and on being burned, goes entirely into a fine red ash. This is the richest and purest cannel coal that the writer has found in Kentucky, and it is probably unsurpassed anywhere. Sad to relate, a close and careful investigation of the pocket and adjoining hills reveals the existence of only about three acres of this remarkable coal; another commentary upon the disappointment to which the searcher for this elusive mineral is subject.

In Perry, Knott, Letcher and adjoining counties, some excellent outcrops of cannel are found, but with the invariable pockety character of this coal strongly pronounced. On Lot's Creek, in Perry county, near Grigsby's, the following section is found:

Coal	23"
Cannel coal	21"

And indications point to a fair-sized pocket in this vicinity.

On Lost creek, in the same county, No. 4 coal shows occasionally as cannel, but generally thin. In this vicinity No. 5 coal crops, carrying a cannel block on the bottom, running from 10 to 22 inches in thickness, accompanied by a considerable thickness of bituminous. The cannel, however, is not of a first-class quality.

In Letcher county, on Rock House creek, near Collins, No. 5 coal crops high in the hills, and with but a small available area, with the following section:

Coal	4′ 10″
Slate	2½″
Cannel coal	2′ 0½″

On Defeated creek, in this county, three feet of fine cannel is found. Enough work, however, had not been done, at date of visit, to determine whether or not any area of this thick coal exists. An analysis of this coal by Mr. McCreath shows it to be a very inferior coal.

Water	.526
Volatile matter	40.444
Fixed carbon	42.000
Sulphur	.470
Ash	16.470
	100.00

In Leslie county some heavy cannel outcrops are found, but those examined by the writer, in nearly every case, were of a poorer quality, and, in some cases, verging closely on a cannel slate.*

In Owsley county, on the South Fork of the Kentucky river, above Beattyville, an excellent quality of cannel coal is found, and in considerable thickness. The outcrop, unfortunately, is very high in the hill, and the area in each of the knobs consequently small. This coal, however, is of excellent quality, as will be seen from the following analysis:

MERRILL COAL, ANALYSIS BY DR. PETER, 1892.

Moisture	0.56	
Volatile matter	47.69	
Fixed carbon	46.84	
Ash	5.41	Air dried.
	100.00	

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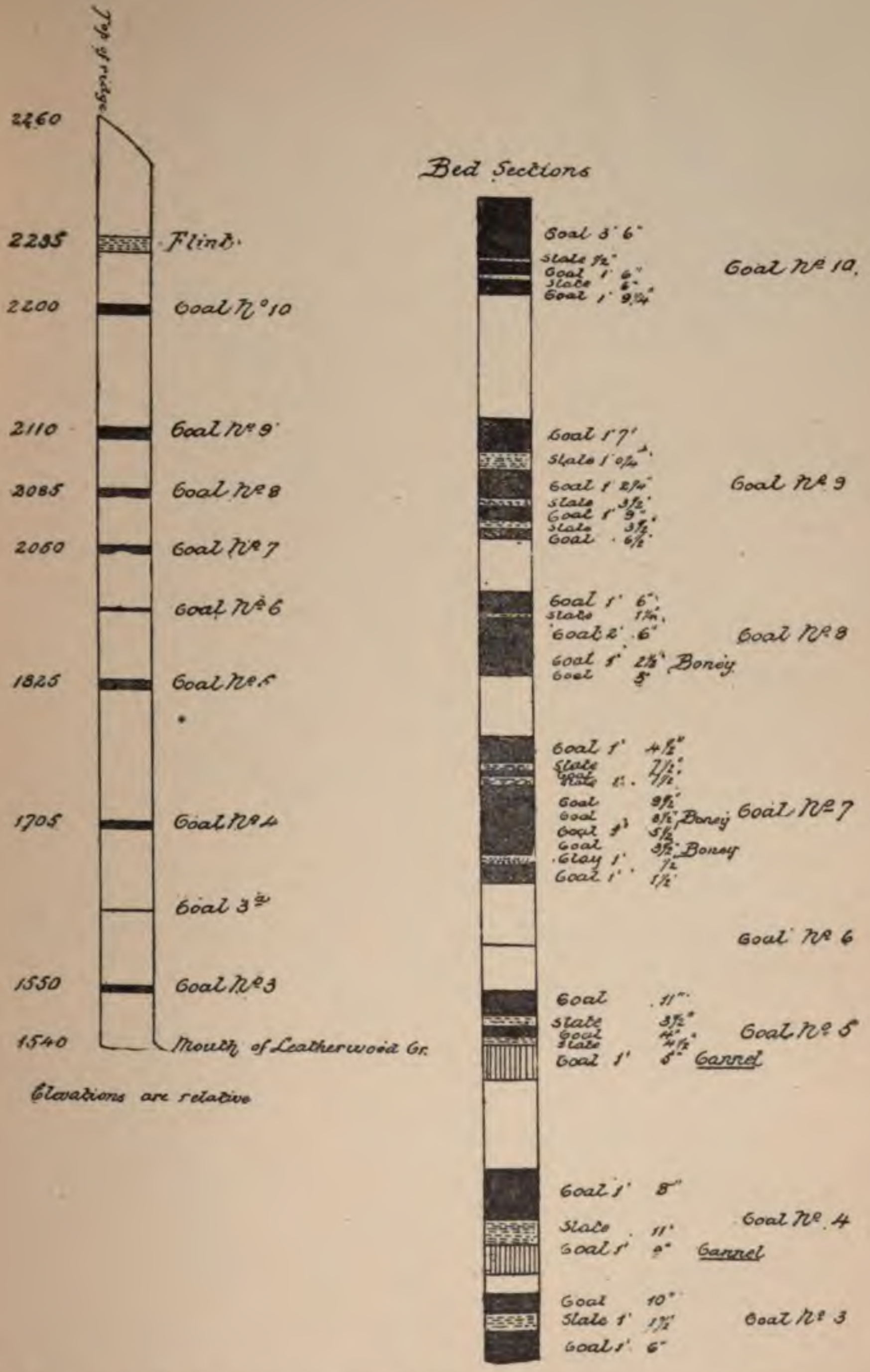
however, some deposits of excellent cannel in Leslie county.—C. J. N.



Elevations are relative

Vertical Section & Bed Sections From Mouth of Leatherwood Creek
To Top of Flint Ridge Mountain, Breathitt Co.

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REYNOLDS' COAL, OWSLEY COUNTY, BY DR. PETER, 1893.

Moisture	0.45	
Volatile matter	55.04	
Fixed carbon	34.76	
Ash	9.75	Air dried.
	100.00	

This cannel runs high in ash, and in places resembles a cannel slate.

ANALYSES OF OWSLEY COUNTY CANNEL BY CONSOLIDATED GAS COMPANY, NEW YORK,

	No. 1.	No. 2.
Volatile matter	52.60	53.30
Fixed carbon	43.60	43.20
Ash	3.80	3.50
	100.00	100.00

This coal bears a close resemblance to the well known Breckenridge cannel in structure and general appearance.

In Lee county no cannel outcrops of any importance are found, most of its area being covered by the inter- and subconglomerate measures alone; but this is more than atoned for by the excellent and unrivaled quality of bituminous coal found in one of the three beds carried by these measures. This coal crops about two hundred and twenty feet above the base of the conglomerate, and, in the vicinity of Beattyville, its height above the Kentucky river is about one hundred and twenty-five feet. This coal, which in former years was extensively boated down the river to points below, even then had earned an excellent reputation. The completion of the Winchester, Beattyville and Cumberland Gap Railway to Beattyville, from a point on the Kentucky Union, six miles distant, within the past year, has hastened the development of this coal. Already three mines are in active operation, with an output, at present, of from ten to fifteen cars per day, and other contemplated developments are in motion. A section taken from the face of main entry (No. 2) of the Beattyville Coal Company's mine, the largest producer in the region, will give a fair illustration of the average thickness of the bed.

Section, face of main entry (No. 2 opening) Beattyville Coal Company's mines on Mirey branch:

S. S. Rock:

Slate	4' 0"
Coal	7"
Splint coal	2' 6"
	3' 1"

The splint is a hard, sound, clean, bright coal, free burning, and with some slight cannel properties. Its qualities have been long known. It is the richest and purest bituminous coal that the writer has found in Kentucky or Tennessee. The completion of the R., N., I. & B. Railway, in the near future, will open another, and much needed, outlet. The area of this bed at its best is probably not large. The coal thins going up the North Fork to 1' $7\frac{3}{4}''$ at St. Helens, and on the opposite side of the river from Beattyville, on the South Fork, the splint block on the bottom seems to pass into a softer bituminous with an undue proportion of sulphur. An analysis of this coal from an opening on Mirey branch shows the following results:

Specific gravity 1.307

Hygroscopic moisture	3.10
Volatile combustible matters	36.64
Coke	60.26
	100.00

The quality and character of this coal will enable it to force its way into distant markets that few other Kentucky bituminous coals can reach, owing to their lack of yarding qualities.[*]

In Carter county, No. 4 coal carries some excellent cannel deposits. The Lexington and Carter County Coal Company are mining a cannel of excellent quality near Music.[†] One of the most valuable deposits in this county, however, is found four miles northeast of Willard Station, the Western extremity of the Eastern Kentucky Railway, and six miles southwest of Leon Station, on the Chesapeake and Ohio Railway, and lying on the waters of the Little Fork of the Little Sandy river. The cannel

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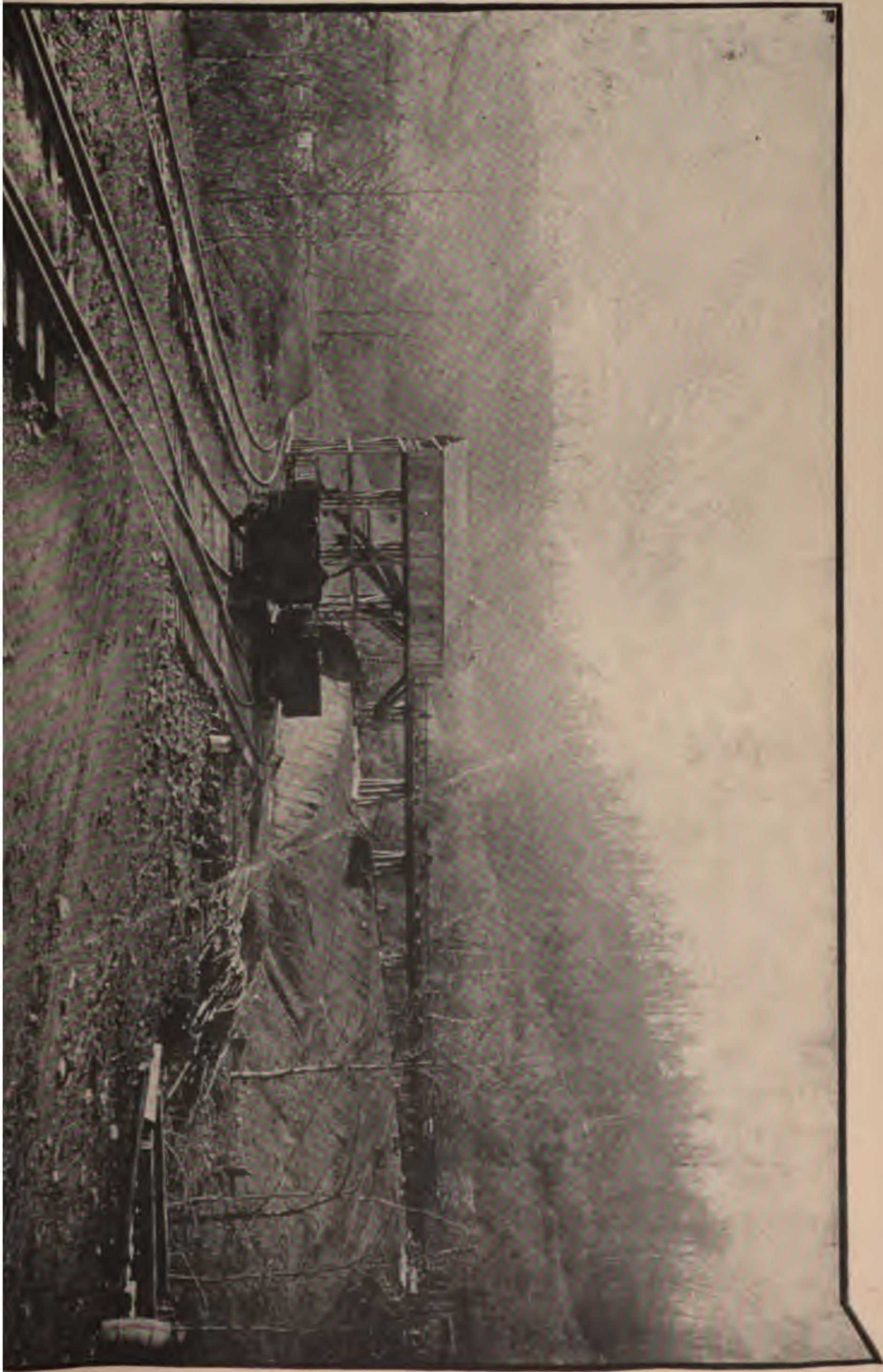
[*] The percentage of fixed carbon in this Beattyville coal ranges from 55.60 to 57.60; that of ash from 3.30 to 6.30; and that of sulphur from 1.080 to 1.368.—C. J. N.

[†] The Kentucky Cannel Co. is also mining this cannel in Carter county. The seam is known throughout the region as the "Hunnewell Cannel." It is rich in volatile combustible matters, having high candle-power.—C. J. N.



blocks vary in thickness from ten (10) to thirty-two (32) inches. The average section, taken from an average of twenty-one measurements, shows a bed section as follows:

Bituminous coal	1′ 2″
Cannel coal	1′ 4″

The quality of this coal is excellent, as the analysis following will show:

	By Dr. Stebbin, New York.	Consolidated Gas Co., New York.
Volatile matter	61.19	58.70
Fixed carbon	30.30	34.50
Ash	7.64	5.90
Moisture	.87	.90
	100.00	100.00

The bituminous coal on top is also of good quality.

In Whitley county an important development has recently been made by the Jellico and Bird-eye Coal Company, who have built seven miles of railroad from Jellico to develop their extensive property. They are now shipping coal from their Bird-eye bed, a beautiful bird-eye coal of splendid quality. Its position here is about one hundred feet below the well-known Jellico seam, now being so extensively mined in that region. An opening near the head of Patterson Creek illustrates this bed at its best.

Cap coal	2″
Coal	1′ 5″
Bird-eye coal	2′ 7″

On the Lawson tract a slightly different section is found.

Coal	11″
Cannel coal	1′ 1″
Bird-eye	11″

The extent and strength of the bird-eye fracture varies near the top and bottom of the block in the Polley opening. This coal is a semi-cannel, with remarkable free burning qualities. Its purity is indicated by the following analysis:

Bird-eye Coal, analysis by H. M. Curry, of Carnegie & Co.:

Volatile matter	43.910
Fixed carbon	54.810
Ash	1.250
Sulphur	.604

Analysis by Andrew McCreath, of Philadelphia:

Volatile matter	47.170
Fixed carbon	52.247
Sulphur	1.148
Ash	1.125
Moisture	2.300
Coke	64.52

Important developments have recently been made in Bell county by the Breckenridge Syndicate, Limited, and the Log Mountain Coal, Coke and Timber Company, and the latter should be a heavy shipper, their railway connecting them with the Louisville and Nashville being now completed. The following analysis of the cannel of the Breckenridge Syndicate, Limited, shows it to be a good coal for gas enriching purposes, although running high in ash:

Volatile Matter:		
Gas, tar, etc.		52.28
Sulphur		1.66
Moisture		1.78
		55.72
Coke:		
Carbon	25.14	
Sulphur	1.25	
Ash	17.89	44.28
		100.00

Illuminating power, 37.87 candle power.

Cubic feet of gas per ton of 2,240 pounds, 13,298 feet.

From the following figures, taken from the reports of the State Inspector of Mines relative to the output of cannel, the growing importance of the industry can be seen:

	Calendar Year, 1892.	First Half of 1893.
Carter county	8,760 20	1.510 00
Greenup	2,831 38	225 94
Hancock	13,450 28	4,205 86
Johnson	27,450 28	12,347 85
Lawrence	231 00	420 00
Magoffin	850 00	310 00
Bell	270 00	1,198 00
Total short tons	53.842 86	20.217 65*

Prospective development of cannel fields will depend to a great extent upon the demand for export cannel for foreign markets for gas enriching purposes. The amount used in this country has for some time been steadily decreasing, owing to the increased use of water gas. The cost by the latter process is small, compared with the use of an expensive gas enriching cannel, as in the manufacture without the latter the two gases, coal and naphtha, or water gas, are mixed in equal proportions. This makes the illuminating power of the gas 21 or 22 candles. The Consolidated Gas Company, of New York, in former years, used to use from 25,000 to 30,000 tons of cannel per annum for enriching purposes. They now use only a few thousand tons. This applies to all the large gas works in this country. On the other hand, the handling of large quantities of naphtha oil is attended with great risk and danger, especially in large cities, and a first-class cannel will always find a ready market at a certain price, and this, to a great extent, is governed by the question of transportation. There is a good market in South America, England and portions of the Continent. The exhaustion of the English cannels is rapidly taking place, and Kentucky alone can take their place in any quantity. Towards the end of 1892 the City of London ceased to use cannel gas, an event marking an important epoch in the cannel trade. This was caused by the fact that about the only available cannel in quantity coming into this market, the Scotch Lesmahagow, cost 58 shillings per ton, delivered in the Thames. Sufficient quantity could not even be obtained even at this price, and as ordinary coal will not yield 16 candle power gas, crude oil from Russia is employed to maintain the statutory power. By this means the gas companies in that city were able to furnish 16 power candle gas at 3s 1d per 1,000 cubic feet, as against 4s 9d for cannel gas, a difference which the public were quick to appreciate and accede to. The large amount of gas now used for cooking purposes has also tended to lessen the demand for a gas of high illuminating power. Great improvements have also been made in the past few years in gas burners. The following table will show in a condensed form the relative values of different well known cannel coals. In this it will be noticed that Kentucky stands at the front with the celebrated Breckenridge cannel, which, unfortunately, is now exhausted:

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* For output for calendar year 1893, see statistical part of this Report.—C. J. N.

COMPARATIVE VALUE OF DIFFERENT WELL-KNOWN CANNEL COALS.

NAME OF CANNEL.	Situation.	Gas per ton.	Coke per ton in pounds.
George's Branch Cannel	Kentucky . . .	13,300	. . . .
Abram Coal Company. . . . . . . (4 feet Cannel.)	Wigan	14,800	1,024
Bestwood Coal Company.	Nottingham . .	11,680	1,209
Blundell & Son . . . . (Wigan Cannel.)	Wigan	11,870	1,415
Boghead . . . . (Black Variety.)	Bathgate . . .	15,750	817
Bromilow, D. & Co. . . . . (St. Helens.)	Mold	11,570	1,200
Crippen, W. & F.. . . . . (4 feet Cannel W. R.)	Wigan	17,300	920
Hicbibi Collieries . . . . (Ellerback Cannel.)	Wigan	11.650	1,340
Hindley Field . . . . (Wigan 4 feet Cannel.)	Wigan	12,800	1,053
Pearson & Knowles . . . . (Wigan Cannel.)	Wigan	11,870	1,415
Rose Bridge . . . . (Wigan Cannel.)	Wigan . .	11,125	1,414
Scott Lane Colliery . . . . (Wigan Cannel.)	Wigan	11,980	1,411
Breckenridge Cannel . . . . . . (Kitt's Analysis.)	Kentucky . . .	15,200	4,816
Bellsdyke	Scotch Cannel .	14,380	1,072
Leshmahagow Main. . . . . (Watson's.)	" "	13,360	1,058
Lesbmahagow Main. . . . . (Auckenheath.)	" "	13,201	1,019
Monkland	" "	13,120	1,012
Muirkirk, No. 1	" "	12,160	1,125
Muirkirk, No. 2	" "	10,811	1,174
Balbardie	" "	11,885	1,115
Vogrie	" "	11,642	1,030
Kinniel	" "	12,070	1,230
Roslin	" "	11,410	1,090
Greenhill Shale	" "	10,140	1,290

COMPARATIVE VALUE OF DIFFERENT WELL-KNOWN CANNEL COALS.

Ash in Coke per cent.	Specific Gravity of Coal.	Illuminating Pcwer.	Value of Gas per ton of Coals in pounds Sperm.
11.40	1.350	31.15	1,420 00
5.08	1.134	29.23	1,483 21
19.83	1.237	18 21	729 17
4.37	1.262	22.78	927 08
68.21	1.175	38.39	2,073 00
7.68	1 176	19.87	788 41
7.77	1.122	30.07	1,783 56
6.25	1.272	17 27	743 57
7.40	1.084	23.25	1,027 00
4 37	1.262	22.78	927 08
5.00	1.268	22.63	863 00
4.60	1.260	22.80	936 00
35.00	1.075	46.20	2,407 00
13.20	....	37.22	1,835 00
9.40	....	33.72	1,543 12
10.60	....	34.52	1,562 39
13.80	....	36.12	1,617 68
4.80	....	32.54	1,356 60
12.86	....	31.62	1,172 03
11.30	....	33.83	1,378 52
5.13	....	32 39	1,290 00
8.02	....	30.89	1,277 00
13.15	....	27.72	1,084 00
69.55	....	36.13	1,256 00

The commercial value of a high grade gas enriching cannel is easily determined by comparison with standard cannels. To those interested in this subject, I would refer them to the admirable work recently published by Mr. David A. Graham, of London, "Comparative Commercial Values of Gas Coals and Cannels," in which the subject is treated most exhaustively. While any rapid development of the cannel coals of Kentucky can not be expected during the present depressed condition of affairs, it will undoubtedly come in the future. It is to be hoped that careful and systematic investigation in competent hands will precede such development, and disappointment, such as the development of properties like the Breckenridge pocket caused, will not have the effect of intimidating capital.

CHARLES HENDRIE.

DECEMBER 20, 1893.

APPENDIX.

[C. J. N.]

As an interesting appendix to Mr. Hendrie's paper, the following report, by Mr. Geo. R. Hislop, of Paisley, Scotland, on the Bear creek cannel bed, wrought by the Log Mountain Coal, Coke and Timber Company, in Bell county, is given. A comparison of the results obtained from this coal with the values given in the table of "Comparative Values," etc. (prepared by Bainbridge, Seymour & Rathbone), inserted in Mr. Hendrie's paper, shows it to rank with the very best cannels known. The sample upon which the report was based consisted of a crate of the cannel, representing the full thickness of the bed. The report is as follows:

MINERALOGICAL CHARACTERS.

The coal is black, possesses very high luster and yellowish brown streak; irregular in fracture and in cross-fracture, partly highly conchoidal and partly curly; very compact and cohesive, and of very uniform composition and density. On the fire it largely intumesces and agglomerates. Color of ash dark brown. Thickness of seam 48 inches. Mean specific gravity 1152 (Water 1000). Weight of one cubic foot, 72.0 pounds.

CHEMICAL ANALYSIS.

Volatile matters (containing .41 of sulphur)			54.07 per cent.
Coke, consisting of	Carbon	40.88	44.41 per cent.
	Sulphur	.16	
	Ash	3.42	
Water expelled at 212 degrees Fahr.			1.52 per cent.
			100.00

PRACTICAL RESULTS.

GASEOUS PRODUCTS.

Gas per Ton of Coal at 60° Fahr., and 30 in. Bar.	**14,630 cubic feet.**
Gas from one cubic foot of the coal	470.25 cubic feet.
Specific gravity of the gas	745 (air 1000).
Hydro-carbons absorbed by bromine	18.30 per cent.
Durability of one cubic foot by 5-inch jet flame	**78 min., 45 sec.**
Value of one cubic foot of gas in Sperm	989.76 grains.
Value of Gas from one ton of Coal in Sperm.	**2068.69 pounds.**
Illuminating power of Gas in Standard Candles	**41.24 candles.**
Sulphuretted hydrogen (H^2S) in foul gas	1.20 per cent.
Carbonic acid ($C\,O^2$) in foul gas	1.80 per cent.
Carbonic oxide ($C\,O$) in foul gas	7.75 per cent.
Sulphur eliminated with volatile products	9.18 pounds.

LIQUID PRODUCTS.

Tar per ton of coal	26.68 gallons.
Ammoniacal liquor, per ton of coal	6.30 gallons.
Strength of ammoniacal liquor	5.00 deg's Twadd.
Hygrometric water, per ton of coal	3.40 gallons.
Aqueous absorbent capacity of coal (*determined by complete Saturation*)	1.75 per cent.

SOLID PRODUCTS.

Coke per ton of coal	994.78 pounds.
Carbon in the coke	92.30 per cent.
Ash in the coke	7.70 per cent.
Sulphur in coke per ton of coal	3.58 pounds.
Heating power of one pound of coke (*Water from boiling point into Steam*)	12.68 pounds.

REMARKS.

This is a cannel coal of exceptional value, as it is one of remarkable light-giving power and purity. Yielding, as it does, a sperm value of illuminating matter amounting to **2068.69** pounds per ton, while at same time affording a light and spongy coke of excellent quality. The coal contains a very small percentage of both water and sulphur. Compared with Main Lesmahagow Cannel Coal, represented by 100 (calculated on the basis of a production of 13,000 cubic feet of gas and 1585.5 pounds of sperm per ton, and having regard also to the value of the secondary products and the cost of the purification of the gas) this coal is equal to **137.11**.

GEO. R. HISLOP,
F. C. S., F. I. Inst., F. R. S. S. A., Gas Engineer.

Paisley Gas Works, October 26, 1893

SCOTCH AND KENTUCKY CANNEL.

The following table of analyses of Scotch cannels, derived principally from reports of Mr. Hislop, is given for purposes of reference, and in order that comparisons may be made with the Bell county cannel:

NAME OF COAL.	Gas per Ton of Coal in Cubic Feet.	Illuminating Power of Gas in Standard Candles.	Durability of one Cubic Foot of Gas by 5-inch Flame. Min. Sec	Value of Gas from one Ton of Coal in Pounds of Sperm.	Sulphur in Volatile Matters	Coke per Ton of Coal in Pounds	Quality of Coke, Ash Per Cent.
Bear Creek (Log Mountain Co.)	14,630	41.24	78 45	2,068.69	.41	994.78	7.70
Lesmahagow (Main-Auchenheath)	18,201	34.52	66 40	1,562	.53	1,019	10 60
Bathville Boghead	14,190	42.66	88 0	2 149.	.11	770	75.76
Ardriehill	13,646	38.30	77 43	1,796.60	.36	999	11.80
Tyne Boghead	18,155	38.22	73 36	1,723.	.38	1,301	17.2
Miller's New Boghead	18,165	36 16	70 0	1,632.	.17	976	22.03
Monkland	18,120	36.12	71 40	1 617.	.35	1,012	13.80
Faskin	11,750	37.15	75 35	1,495	09	1 040	13.03
Arniston	12,660	35.46	69 0	1,527.	.34	906	6.33
Newbattle	12,461	35 34	69 30	1,509.	.51	983	7 00
Muirkirk No. 1	12 160	32.54	67 15	1,356.	.35	1,125	4.80
Niddrie No. 1	12,880	32.45	62 30	1,371.8	.48	1,074	4.80
Kinneil	12,070	30.89	66 0	1,277.	.67	1,280	8.02
Balbardie	12,088	34.31	65 47	1,421.	.23	1,056	4.13
Leven	18,676	34.10	64 28	1,598.	.52	1,060	43 84
Denbog	18,189	35.23	67 48	1,593.	.44	1,080	36.8
Woodville	12,570	35.84	72 19	1,645.	.56	980	7.85
Monkshead	11,280	31.58	64 26	1,215.	.30	1,152	19 3
Morton	12,461	35.34	69 30	1,510.	.51	989	7.00
Auchlochan Six-foot	12,716	32.43	62 18	1,413.	.57	1,194	30.4

Muirkirk No. 2	10,811	31.62	68 86	1,172.	46.	1,174	12.36
Bank Cannel	10,806	27.28	57 8	1,010.	. . . .	1,190	5.31
Barrhead	10,840	27.35	55 28	1,016.	.38	1,251	9.20
Woodside	10,790	27.88	54 35	1,013.	.34	1,115	9.65
Mainhill	11,125	29.07	58 0	1,108.	.16	1,260	16.71
Tennochside	10,913	28.32	56 30	1,059.	.46	1,250	17.20
Clyde	10,904	25.85	53 40	966.	.44	1,260	6.4
Bent	10,875	24.61	51 18	917.	.48	1,286	5.6
Cadzow	10,920	25.12	52 16	940	.49	1,255	5.2
Westburn	10,808	24.10	51 10	889.	.35	1,145	2.60
Parkhead	10,818	23.33	49 20	861.	.39	1,265	6 80
Merryton	10,660	24.16	51 6	883.	.31	1,300	8.76
Broomhouse	10,647	27 2	55 38	992.	.41	1 267	16.8
Bankend (whole seam)	10,112	21.23	44 50	736.	.29	1,228	8 80
Fauldhouse (whole seam)	10,301	22.30	48 46	787.	.33	1,218	9.20
Carfin	9,842	22.42	48 39	756.	.24	1,295	7.20
Greenhill or Wyndedge Shale	10,140	36.18	73 0	1,256.	.69	1,290	69.55
Glenclelland Shale	10,502	34.3	67 10	1,235.	.56	1,234	45.76
Wyndford Shale	11,870	37.52	70 38	1,526.	.52	1,202	57.2
Eglinton Park	10,948	28.68	57 8	1,076.	.56	1,287	22.4

X.

KENTUCKY COAL AT THE WORLD'S FAIR.

Col. M. H. Crump, of Bowling Green, who had charge of the mineral exhibit made by the Kentucky Commissioners, has kindly furnished the following statement concerning the display of Kentucky coal at the World's Columbian Exposition:

"BOWLING GREEN, KY., January 11, 1894.

"HON. C. J. NORWOOD, *Chief Inspector of Mines:*

"DEAR SIR: You will please find a brief report on the Kentucky coals at the World's Fair, which you can use as you see fit:

"The State was represented by 60 sections (2'x2' and the thickness of the seam) of the type coals of both the Eastern and Western Fields. This exhibit attracted great attention, and was excelled by no State in the Union, and was only equalled by West Virginia in its quantity and excellence. It was largely due to the liberality and energy of the coal operators or land owners that so creditable collection was made in the very short space extending from February 1st to May 1st, 1893.

"More than thirty awards, carrying medals and diplomas, setting forth the various qualities of the coals, were received. It was a source of much surprise to the world to find that Kentucky claimed to be a mineral State, as heretofore it has been known chiefly from its live stock and agricultural products. In cannel coal, it far exceeded any other State, while its entrance composed of this material was greatly admired and widely and favorably commented on. No less than fifty papers, from Maine to California, reproduced the cut, with a description. Not less than 400,000 visitors passed under the arch and inspected, more or less critically, the exhibit; of these, more than 75,000 left their names upon the register.

"*Eastern Kentucky* was represented by: Log Mountain Coal, Coke and Timber Co., Pineville; 2 sections of cannel and 3 of bituminous; award. Maysville Cannel Coal Co., Maysville; 1 section of coal; award. North Jellico Coal Company, Grays; 2 sections; award. Lily Coal and Mining Co., Lily; award. Bryvan Coal Co., Pine Knot; 1 section. Breckenridge and Pineville Syndicate, Pineville; 3 sections. Russell and Means Iron Co., Ashland; 2 sections. R. P. Hare, Louisville; 1 section of cannel. Ashland Coal and Iron Railway Co., Ashland. East Tennessee Coal Co., Jellico; award. Red Ash Coal Co., Jellico; award. Greasy Cannel Coal, Knox county. Main Jellico Mountain Coal Co., Kensee; award. Mingo Mountain Coal and Coke Co., Middlesborough; award.* East Kentucky Land Co., Mt. Sterling; 1 section of cannel; award. Haddix Cannel, Breathitt county; award. George's Branch Co., Jackson, Breathitt county; award. White House Cannel Coal Co., Myrtle, Johnson county; 1 car load and 1 section of cannel; award. Elkhorn Coking Coal; 1 section from State Museum; award. Inter-State Investment Co., Louisville; 2 sections; awards. Birdeye and Jellico Coal Co., Halsey, Whitley county; award. Frozen Creek (Breathitt county) Coal, 1 small section from the State Museum. Small sections of Greenup county coal, and of coal from Looney creek, Harlan county, from the State Museum. Sample of the Isaac Coal, Jackson county. Ten small sections of coal, and 139 hand-specimens of coal and coke, from the State Museum.

"*Western Kentucky* was represented by: St. Bernard Coal Co., (No. 11 mine), Earlington; award. Hecla Coal and Mining Co. (No. 11 coal), Earlington; award. St. Bernard Coal Co., Earlington; 1 section of No. 9 coal; award. Hecla Coal and Mining Co., Earlington; 1 section of No. 9 coal; award. Memphis Coal and Mining Co., Bevier; section of No. 9 coal. Ohio County Coal, Centertown; section of coal was broken. Central Coal and Iron Co., Central City. Providence Coal Co., Providence; award. Mud River Coal, Coke and Iron Co., Mud River; award. Empire Coal and Mining Co., Empire; award. Aberdeen Coal Co., Morgantown; award. Main Nolin Coal, from Edmonson county; award. Lignite from Ballard county. Breckenridge Co., Limited, Cloverport; 1 car load and 1 section of cannel from its mines in Hancock county; award.

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*The operations of this company are in Tennessee, but the coal extends into Kentucky.—C. J. N.

"The Cannel Arch, 23 feet by 27 feet in dimensions, was composed of one car of Breckenridge cannel, one car of White House cannel, and specimens of cannel from Knox county, from Bell (furnished by the Log Mountain Coal, Coke and Timber Co.), and from the mines of the Maysville Co. It received an award.

"Each of the above-mentioned sections were surrounded at the base by a dozen or more large hand-samples, and with samples of coke, made at Earlington, from five barrels of coal, which were carried to the above-named places, without cost, by the L. & N. and other railroads of the State. All of these coals, embracing some fifty or more sections (or about two hundred barrels of coal), were crushed, washed and coked, from 24 to 72 hours, by John B. Atkinson, of the St. Bernard Coal Company, without cost to the State.

"The State was also represented in the technical department of the Fair by thirty or more small sections, which were carefully analyzed, the results of which will appear in the official report of the coal expert of the Fair.

"Respectfully,

"M. H. CRUMP,

"*Director Kentucky Mineral Exhibit W. C. Ex.*"

XI.

NOTES ON THE MINES.

It is, of course, impossible to state the condition of each mine at the time of preparing this report. By referring to the Inspection Notices, given in the following chapter, the condition of the respective mines at various times during the year, when a written notice was deemed desirable, may be ascertained. Many of the inspections were made in September, October, November and December, and the notices for those months cover most of the mines.

NORTHEASTERN DISTRICT.

Output, in bushels, of bituminous coal for 1893, 9,954,957.
Output, in tons, of cannel for 1893, 32,789.
Employes for 1893: Maximum, 2,041; average, 1,481.

BOYD COUNTY.

[Output in bushels of 80 pounds.]

Output for calendar year 1893: Lump, 2,377,465; nut, 465,595; run of mines, 587,566; slack, 402,207. Total, 3,832,833.

Employes for calendar year 1893: Maximum, 468; average, 360.

ASHLAND COAL AND IRON RAILWAY COMPANY'S MINES.

During the past year both mines of this company, *Kilgore No. 5* and *Rush No. 6*, have been in operation. The P. O. address of the Mine Superintendent has been changed from Coalton to Rush. Officers of the company are: Douglas Putnam, Jr., President and General Manager; Robert Peebles, Secretary and Treasurer; E. C. Means, Superintendent. Head office, Ashland. Mr. Jacob Schugh has been succeeded by James Heron as Superintendent at the mines.

The output of the two mines is given above.

A new mine, No. 7, has been opened at Grant's Switch, and has been driven in 230 feet. A new tipple has been erected there and eight houses built for miners. Kilgore No. 5 mine has been abandoned—coal worked out.

The last inspection of the Rush mine was made by Mr. Grider, on Oct. 27th. The timbering and drainage were found to be good; likewise the ventilation, except in certain rooms. See Notice 398.

BREATHITT COUNTY.

[Output in bushels of 80 pounds.]

Output for calendar year 1893: Lump, 40,444; nut, 4,575; run of mines, 137,319; slack, 13,400. Total, 195,738.

Employes during calendar year 1893: Maximum, 50; average, 28.

ELKATAWA MINE.

This mine (at Elkatawa), the property of the Kentucky Union Land Co., was closed down in September.

The output is given above.

CARTER COUNTY.

[Output in bushels of 80 pounds.]

Output of bituminous coal for calendar year 1893: Lump, 852,059; nut, 472,679; run of mines, 1,532,645; slack, 72,452; mixed lump and nut, 13,891; pea, 102,496; slack and pea, 86,697; nut and pea, 47,087. Total, 3,180,006.

Output of cannel for calendar year 1893, 5,309 tons.

Employes for calendar year 1893: Maximum, 658; average, 462.

LOST CREEK MINE.

At Willard. P. O. Willard.

Operated by Eastern Kentucky Railway Company, H. W. Bates, Vice-President; Geo. Gibbs, Superintendent.

Output in bushels for the calendar year 1893; Lump, 177,522;

nut, 46,168; run of mines, 38,941; mixed lump and nut, 13,892; pea, 22,041; nut and pea, 47,086. Total, 345,650.

A new furnace and stack to secure ventilation were put in during the year.

STAR FURNACE MINES.

These mines, the property of the Norton Iron Works Co., were abandoned in June—coal exhausted.

Output in bushels for 1893, all run of mines, 93,315.

MT. SAVAGE MINE.

Near Mt. Savage. P. O. Music.

Operated by the Lexington & Carter County Mining Co. Head office, Lexington, Ky. Officers, R. H. Courtney, President and Treasurer; W. W. Estill, Vice-President; W. L. Carter, Superintendent.

Output in bushels for calendar year 1893: Lump, 87,350; nut, 44,517; run of mines, 276,905; slack, 7,251; pea, 16,326. Total, 432,349.

This mine is rapidly drawing to a close—approaching exhaustion.

THE MUSIC BITUMINOUS MINE.

Near Music. P. O. Music.

Operated by the Lexington and Carter County Mining Co. (For officers, see Mt. Savage mine.)

Output in bushels for calendar year 1893: Lump, 52,823; nut, 23,919; run of mines, 97,400; slack, 427. Total, 174,569.

When last inspected (Oct. 28th), this mine was nearly exhausted, there being but few stumps in it. See Notice 400.

STINSON CANNEL MINE.

Near Music. P. O. Music.

Operated by the Lexington & Carter County Mining Co. (For officers, see Mt. Savage mine.)

Output of cannel in tons for calendar year 1893, 4,769.

The latest inspection of this mine was made by Mr. Grider, on October 28th, who reported as follows: "Work is confined to drifts 2, 3 and 6. No. 2 is on stumps, and is in as good condition as could be expected under such circumstances. No. 3

is ventilated by a furnance, but the air is not well conducted to the workings. The mine is well timbered and drained. No. 6 is without artificial ventilation, but is well timbered and drained." See Notice 399.

WILBURN MINES.

Near Denton. P. O. Denton.

Operated by the Mary Coal Co. Officers are: J. D. Hazelrigg, President; W. H. Strossman, Sales Agent and Secretary; Roland Pritchard, Superintendent.

Output for calendar year 1893: Lump, 118,051; nut, 124,190; run of mines, 152,980; slack, 19,774; pea, 48,159. Total, 463,154.

Practically no improvements were made at these mines during the year. Mr. Grider visited this region at the time other mines were examined in October, but was compelled to return to the office before inspecting these. These will be examined at an early date.

STRAIT CREEK MINES.

Near Denton. P. O. Denton.

Operated by the Strait Creek Coal Co. M. M. Cassidy, President; Kent Prichard, Superintendent; Wm. Mitchell, W. T. Hibbs, Directors. Head office, Mt. Sterling.

Output in bushels for calendar year, 1893: Lump, 362,683; nut, 194,039; run of mines, 424,501; slack, 45,000; pea, 15,970; slack and pea, 86,697. Total, 1,128,890.

The latest inspection was made by W. U. Grider on October 30th, who reported as follows: "The drainage of this mine is excellent, and the timbering is fairly good. That part of the mine north of the main entry is without artificial means of producing ventilation. With one small exception, the ventilation on the south side is good." See Notice 401.

KENTUCKY BOGHEAD MINE.

Near Music. P. O. Grayson.

Operated by the Kentucky Cannel Co. Graham Macfarlane, President; M. Senter, Secretary; B. M. Allison, General Manager and Treasurer.

This is a cannel mine. Output in tons for calendar year 1893, 540.

The opening of this mine was commenced late in 1892. Comparatively little headway was made until early in 1893. Beginning in June of the latter year, 3½ miles of standard gauge railroad were built from the Eastern Kentucky Railway to the mines, on Lower Stinson Creek; 150 yards of entry were driven; 600 feet of tramway, from the mouth of main entry to drum-house were built; built a drum-house, put in overhead drum, and made an incline 235 feet long; built platform for cleaning coal and loading into railroad cars; put in scales; built 12 and repaired 4 miners' houses during the year. The plant was completed January 20, 1894.

JOHNSON COUNTY.

Output of cannel, in tons, for calendar year 1893, 24,859.17.

Employes for calendar year 1893: Maximum, 191; average, 170.

WHITE HOUSE MINE.

At White House. P. O. Myrtle.

Operated by the White House Cannel Coal Co., Dr. Harry A. Wood, President; Jay H. Northup, General Superintendent and Treasurer; F. F. D. Wallace, Secretary. Head office, Louisa, Lawrence county.

Output in tons for calendar year 1893, 18,774.

The latest inspection of this mine was made by Mr. Grider, on October 25th, who reported as follows: "Main entry to No. 4 drift was 'working' so much that this opening could not be inspected. Drifts 3, 5 and 6 are in good order as to drainage and timbering; but the mine is without artificial means of ventilation." See Notice 395.

SANDY RIVER MINE.

At White House. P. O. Myrtle.

Operated by the Sandy River Cannel Coal Co.—F. A. Stacey, J. P. Dieter and G. O. Richardson.

Output of cannel, in tons, for calendar year 1893, 6,085.17.

The last inspection of this mine was made by Mr. Grider, on

October 25th, who reports: "Work was confined to, and the inspection extended through the Second Right entry, and the rooms turned off of it. Ventilation, drainage and timbering were found to be good."

LAWRENCE COUNTY.

Output of bituminous coal, in bushels, for calendar year 1893: Lump, 1,454,925; nut, 153,987: run of mines, 9,514; slack, 494,025; mixed lump and nut, 25,400; pea, 184,387. Total, 2,322,238.

Output of cannel, in tons, for year 1893, 855.

Employes for calendar year 1893; maximum, 446; average, 279.

THE "ANNIE" AND "ELIZABETH" MINES.

At Peach Orchard. P. O. Peach Orchard.

Operated by the Great Western Mining and Manufacturing Company, L. C. Black, Receiver; W. S. Howell, General Manager.

Output in bushels for the calendar year 1893: Lump, 1,413,375; nut, 146,163; run of mines, 1,913; slack, 483,750; mixed lump and nut, 25,400; pea, 184,387. Total, 2,254,988.

Among the improvements made at these mines during the past year, may be mentioned: The tipple was enlarged and fitted with a new elevator appliance; an endless-rope haulage system was put in the Elizabeth mine; a new furnace was put in the Annie mine. New T-rail has been laid, battery of boilers and facilities for obtaining air have been materially improved.

When last visited, by Mr. Grider, the Annie mine was not in operation. The Elizabeth mine was inspected on October 25th (at night), and was found in good condition. See Notice 397.

THE TORCHLIGHT MINES.

At Torchlight. P. O. Louisa.

Operated by the Torchlight Coal Co., Col. Jay. H. Northup, Superintendent.

Output of bituminous coal for calendar year 1893, in bushels: Lump, 41,550; nut, 7,825; run of mines, 7,600; slack, 10,275. Total, 67,250.

Output of cannel in tons for 1893, 855.

When inspected by Mr. Grider on October 25th, no artificial means for producing ventilation had been provided. Otherwise, the conditions were good. See Notice 394.

LEE COUNTY.

[Output in bushels of 80 pounds.]

Output for the calendar year 1893: Lump, 276,208; nut, 89,065; run of mines, 55,257; slack, 725. Total, 421,255.

Employes for year 1893: Maximum, 182; average, 143.

Beattyville Mine.

Near Beattyville. P. O. Beattyville.

Operated by the Beattyville Coal Co. J. P. Amsden, President; Henry Landsberg, Secretary and Treasurer; Charles Hendrie, General Manager.

Output in bushels for year 1893: Lump, 114,281; nut, 43,529; run of mines, 46,507; slack, 475. Total, 204,792.

The plant of this mine is entirely new. Development commenced in May, 1893.

The mine was inspected by Mr. Grider on October 18th. He reports that it was "in good condition in every respect." See Notice 391.

Crystal Creek Mine.

Near Beattyville. P. O. Beattyville.

Operated by the Crystal Creek Coal Co., B. M. Hiatt, President; H. C. McConnell, Vice-President; Allen Hiatt, Secretary and Treasurer.

Output for year 1893 in bushels: Lump, 62,402; nut, 16,036; run of mines, 8,750; slack, 250. Total, 87,438.

This mine was, the larger part, opened and equipped in 1893.

It was inspected by Mr. Grider on October 18th, who reported: "Its condition is bad. The supply of air is insufficient, and poorly distributed. There is not enough timbering in the rooms. The drainage is good." See Notice 392.

THE AVENT MINE.

Near Beattyville. P. O. Beattyville.

Operated by the Avent Beattyville Coal Co., E. P. Avent, President; H. C. McConnell, General Manager; S. L. Wooldridge, Secretary; P. Wooldridge, Jr., Cashier.

Output in bushels for year 1893: Lump, 99,525; nut, 29,500. Total. 129,025.

Mr. Grider inspected the mine on October 18th. He reported as follows: "There is enough air entering the mine, but it is not conducted to the working-places as it should be. There is no timbering done in the rooms, and not enough on the entries. The drainage is good." See Notice 393.

The mine was, for the most part, equipped during the year 1893.

MAGOFFIN COUNTY.

There is but one mine in Magoffin of which this Department takes note; namely, the *Colvin*, operated by the Colvin Cannel Coal Company. The company is composed of A. Young, S. Evans, J. McAlister, S. Baird, J. Smoot and J. Gossett. Mr. J. M. Gossett acts as Secretary, his post-office being Bethel, Bath county. The output of the mine is boated down the Licking, and the operations are rather desultory. The output for 1893 amounted to ——— tons of cannel.

THE SOUTHEASTERN DISTRICT.

Output, in bushels, of bituminous coal for 1893, 26,623,171.

Output, in tons, of cannel for 1893, 6,544.

Production of coke, in tons, for 1893, 11,334.

Employes for 1893: Maximum, 4,293; average, 3,176.

BELL COUNTY.

Output of bituminous coal in bushels, for calendar year 1893: Lump, 42,559; nut, 163,107; run of mines, 1,320,630. Total, 1,526,296.

Output of cannel, in tons, for 1893, 6,544.

Production of coke, in tons, for 1893, 11,334.

Employes for year 1893: Maximum, 432; average, 258.

No. 2, OR WEST PINEVILLE MINE.

Near West Pineville. P. O. Pineville.

Operated by the Breckenridge and Pineville Syndicate, Limited. Wm. Hopper, Manager and Agent, Louisville, Ky.; George Bentley, General Superintendent at the mines. Head office, London, England.

Output of bituminous coal, in bushels, for 1893: Lump, 13,594; nut, 21,400; run of mines, 727,493. Total, 762,487.

Output of cannel, in tons, for 1893, 4,923.

Output of coke, in tons, for 1893, 2,046.

This mine is in the "McGuire Coal," a compound bed of bituminous and cannel, described in the chapter on the coal-fields. What was known as "Colliery No. 2," at West Pineville (also under the control of this company), has been abandoned, and is not to be confounded with the present "No. 2." It is unfortunate, however, that the company did not designate this mine as "No. 3," or in some other way that would prevent confusion.

During the year the grade on the incline was improved and eased, and a powerful winding drum was put in. A new tipple, screens, and 12 miners' houses were erected.

The latest inspection of this mine was made by Mr. Grider, December 4th, who reported: "The rooms are very well timbered. On the entries very little timbering is done, but the roof seems reasonably safe. The mine is well drained. It is ventilated by a furnace, which has sufficient draught; but the air is not well conducted, and fails to reach many of the working places. See Notice 427.

TRUXTON MINES.

Near Pineville. P. O. Pineville.

Operated by the Central Appalachian Company, Limited. The officers are: Lucien Guivotte (Belgium), President; I. W. H. James (New York), Managing Director for U. S. A.; A. Passelecq, Managing Director, Belgium; James Purves, Mine Superintendent.

Output in bushels for year 1893: Lump, 28,965; nut, 141,707; run of mines, 588,349. Total, 759,021.

Output of coke, in tons, for 1893, 9,288.

There are three mines operated by this company, namely: Truxton "A," "B" and "C."

During the year, improvements were made as follows: At "A" mine, in lower seam, a 12-foot fan was put in, as per Inspector's recommendation of November 17, 1892; a system of siphonage also adopted, also in accordance with Inspector's recommendation, but has not yet been extended as far as necessary on the cross entries—goes to head of main entry. A new pump for the coke ovens, and for filling the siphon and the fan boiler, was added, a fan-house and blacksmith shop were built, and about 4,500 feet of new 20-pound rails were laid. At the "B" mine, in upper seam, a 12-foot fan was put in, 500 feet of new track were laid with 20-pound rails, and 2,600 feet of new 30-pound rails were laid on the incline up to the mine. Sixty new cars were added to the equipment of mines "A" and "B." At "C" mine, upper seam: This is a new mine. Four openings were made and timbered to coal; road connecting with the mine graded, and 700 feet of incline graded.

When visited in December these mines were closed, but were expected to be in operation again within a month. See Notices 330 and 331.

MARY HULL MINE.

Near Pineville P. O. Pineville.

Worked by H. C. Thompson under contract with the Log Mountain Coal, Coke and Timber Co.

Blanks for annual report were at different times sent the company, but none has been returned filled out; hence, the names of officers of the company for the past year can not be given. Mr. T. Cairns was Secretary at last account.

Output of cannel for year 1893 in tons, 1,621.

Output of bituminous in bushels for 1893, all run of mines, 4,788.

The mine was inspected December 5th, by Mr. Grider. He reported: "No artificial means for producing ventilation is yet provided. The water in the mine is well controlled, and the timbering is sufficient." See Notice 428.

KNOX COUNTY.

[Output in bushels of 80 pounds.]

Output for calendar year 1893: Lump, 1,659,947; nut, 31,336; run of mines, 500; slack, 409,562; mixed lump and nut, 1,262,575; pea, 643,224. Total, 4,007,144.

Employes for year 1893: Maximum, 350; average, 289.

NORTH JELLICO MINE.

Near Grays. P. O. Grays.

Operated by the North Jellico Coal Co. J. B. Speed, President; I. P. Barnard, Vice-President; W. A. Jones, Secretary and Treasurer; C. S. Nield, General Manager. Head office, Louisville, Ky.

This being the only commercial mine working in this county in 1893, the output was as given above.

During the year 1893 an air compressor (making 2) and 10 more mining machines were added to the equipment. An engine house, a shop and two dwellings were built.

The last inspection was made on December 6th, by Mr.

Grider, who reported: "This mine has a furnace, with ample draught to secure good ventilation, but there are defects in the system of conducting the air which results in failure of ventilation at many working places. The timbering and drainage are good." See Notice 429.

LAUREL COUNTY.

[Output in bushels of 80 pounds.]

Output for year 1893: Lump, 1,769,624; nut, 458,033; run of mines, 3,987,960; slack, 112,501; mixed lump and nut, 531,481; pea, 154,656; block, 137,303. Total, 7,149,558.

Employes during year 1893: Maximum, 1,464; average, 1,097.

ÆTNA MINES.

These mines, which had been operated by Capt. W. A. Pugh, at Pittsburgh, solely for supplying railroad bins, have been abandoned.

Output for 1893, in bushels, 55,301, all run of mines.

DIAMOND MINE.

Near Altamont and East Bernstadt. P. O. Altamont.

Operated by the Diamond Coal Co., Jas. D. Smith, President; H. C. Thompson, General Manager; W. H. Thompson, Superintendent.

Output for 1893, in bushels: Lump, 133,748; nut, 1,065; run of mines, 198,906; mixed lump and nut, 47,325; pea, 14,813. Total, 395,857.

These mines were wholly equipped during 1893. The first coal was shipped March 7th, 1893. In a note to the Inspector, Mr. W. H. Thompson indicates the extent of the development of the mine thus: "Output March 7th, 250 bushels; output December 31st, 520 tons."

The last inspection of this mine was made in August. See Notices 346 and 361.

LAUREL MINES.

Near Pittsburgh. P. O. Pittsburgh.

Operated by the Laurel Coal Co., George Givens, President; J. W. Bastin, Secretary and Superintendent.

Output in bushels for 1893: Lump, 378,192; nut, 96,745; run of mines, 772,927; mixed lump and nut, 26,355; pea, 7,500; block, 16,600. Total, 1,298,319.

A Porter mine locomotive, for hauling coal from the mines to the tipple, was added to the equipment.

The last inspection was made in October. See Notices 337 and 389.

THE LILY MINES.

At Lily. P. O. Lily.

Operated by the Lily Coal Company, Joseph A. Craft, Proprietor; Thomas J. Tapp, General Manager.

Output in bushels for 1893: Lump, 162,812; nut, 25,537; run of mines, 33,150; slack, 43,750; mixed lump and nut, 73,686; pea, 52,871. Total, 391,806.

Until August, the mines were owned and operated by the Lily Mining and Manufacturing Company. On August 14th they were sold by decree of court, and were bid in by the bondholders, whose claims amounted to $75,315. Sixty per cent. of the bonds were held by Judge R. Boyd and Mr. J. A. Craft, and Mr. Craft leased the property.

Considerable has been done in the way of repairs during the year, but no special additions were made to the equipment. Until the formation of the new company, work was carried on in rather a desultory fashion. The mines were visited three times during the year, but were operating on only one occasion, May 10th, when Notice 347 was given.

LITTON MINES.

Near East Bernstadt. P. O. Bernstadt.

Operated by the Litton Coal Co., a firm composed of C. Litton (President), and W. J. Litton (Secretary).

Output in bushels for 1893, all run of mines, 248,668.

No improvements were made during the year. The management of the ventilation of this mine has been very defective. See Notices 345 and 363.

MANCHESTER MINE.

Near Altamont and E. Bernstadt. P. O. Altamont.

Operated by the Manchester Coal Co., a firm composed of Jno. W. Harris, A. W. Harris (Superintendent), and C. R. Coleman.

Output in bushels for 1893: Lump, 27,472; nut, 27,735; run of mines, 21,324; mixed lump and nut, 1,400. Total, 77,931.

This mine was opened and equipped wholly in 1893.

PEACOCK MINE.

Near Pittsburgh. P. O. Pittsburgh.

Operated by the Peacock Coal Co., W. R. Letcher, President; J. E. Greenleaf, Treasurer; Geo. F. Anderson, Secretary and General Manager.

Output in bushels for 1893: Lump, 318,947; nut, 44,246; run of mines, 258,743; slack, 67,151; mixed lump and nut, 219,780; block, 22,208. Total, 931,075. The company is closing out the mine, and will go out of business. See Notices 335 and 386.

PITMAN MINES.

Near Pittsburgh. P. O. Pittsburgh.

Operated by the Pitman Coal Co., W. A. Pugh, President; S. V. Rowland, Treasurer and General Manager; J. M. Bailey, Secretary; Wm. McNeil, Superintendent.

Output in bushels for 1893: Lump, 344,100; nut, 134,835; run of mines, 869,460; mixed lump and nut, 85,510; pea, 60,930; block, 98,495. Total, 1,593,330.

A mine pump was added to the equipment, and 20 houses were built during the year.

The last inspections of these mines were made in October. See Notices 338 and 388 for the East Bank, and 339 and 387 for the West Bank.

STAR MINE.

Near East Bernstadt. P. O. East Bernstadt.

Operated by the Star Coal Co., J. McNeill, President; R. J. Morris, Secretary and Treasurer; George Harrison, Superintendent.

Output in bushels for 1893: Lump, 106,030; nut, 39,484; run of mines, 73,211. Total, 218,725.

[illegible] l improvements were made during the year. The [illegible] on was made in August. See Notices 342 and 362.

UNION MINE.

Near Pittsburgh. P. O. Pittsburgh.

Operated by the Union Coal Co., Thompson Jeffrey, President; Thompson A. Jeffrey, Vice-President; John Jeffrey, General Manager; Isabella Jeffrey, Treasurer.

Output in bushels for year 1893: Lump, 33,850; nut, 7,955; run of mines, 379,466; mixed lump and nut, 9,120. Total, 430,391.

This is the only mine in Laurel which was not visited more than once during the year. The last inspection was made in May (See Notice 341), circumstances compelling the Inspector to return to the office before inspecting it when in the county in September and October.

VICTORIA MINE.

Near Pittsburgh. P. O. Pittsburgh.

Operated by the Victoria Coal Co., Lewis Baxter, President; J. E. Carnell, Secretary; J. J. Hughes, Treasurer.

Output in bushels for year 1893: Lump, 90,393; nut, 26,932; run of mines, 419,059; slack, 1,600; mixed lump and nut, 53,049; pea, 16,620. Total, 607,653.

This mine was last inspected in October. See Notices 340 and 390.

WELSH MINE.

Near Pittsburgh. P. O. Pittsburgh.

Operated by the Welsh Coal Co. In the annual report from the company names of officers are not given. Wm. Welsh is General Manager.

Output in bushels for 1893: Lump, 7,100; run of mines, 254,196.

So far, the output of this company has been used principally for coaling the L. & N. Railroad engines.

The equipment of this mine was completed almost wholly within the last year.

The last inspection was made in September. See Notices 336 and 385.

NICKEL PLATE MINE.

This mine, which was formerly operated by Pearl, Thompson & Co., near East Bernstadt, was abandoned in June.

Output for year 1893, in bushels, 67,000, all run of mines.

PULASKI COUNTY.

[Output in bushels of 80 pounds.]

Output for calendar year 1893: Lump, 353,034; nut, 188,197; run of mines, 1,304,025; slack, 86,854; mixed lump and nut, 264,415; pea, 39,987; block, 38,253. Total, 2,274,765.

Employes for year 1893: Maximum, 391; average, 242.

ALPINE MINES.

At Alpine. P. O. Alpine.

Operated by Howard & Bruner, lessees of Richmond Coal Co., Hugh Howard, Manager; R. L. Bruner, Secretary and Treasurer.

Output in bushels for year 1893: Lump, 64,500; run of mines, 642,750; slack, 11,825; mixed lump and nut, 220,465. Total, 939,540.

During the year an air-shaft was sunk in No. 1 mine, or "machine side." Additional track was laid, and 60 mine cars were added to the equipment.

The last inspection was made by Mr. Grider on December 22d, who reported: "The drainage and timbering here are good; but natural means for ventilation are depended upon." See Notice 433.

BARREN FORK MINES.

At Barren Fork. P. O. Flat Rock.

Operated by the Barren Fork Mining and Coal Co., J. T. Slade, President; G. M. Threlkeld, Vice-President; W. F. Warren, Treasurer; J. H. Holland, Superintendent. Head office, Lexington, Ky.

Output in bushels for 1893: Lump, 279,501; nut, 186,961; run of mines, 300,039; slack, 72,781; mixed lump and nut, 43,950; pea, 39,987; block, 38,253. Total, 961,472.

A new tip-house was built during the year. The last visit to the mines was made on December 19. The mines were idle.

GREENWOOD MINES.

Near Greenwood. P. O. Greenwood.

Operated by the Greenwood Coal Co., a firm composed of J. and W. V. McKnight, W. W. Rees and J. H. Chew.

Output in bushels for 1893: Lump, 9,033; nut, 1,236; run of mines, 314,061; slack, 2,248. Total, 326,578.

These mines are composed of a group of drifts, and for some time have been little more than "scrapping ground." They were last visited by Mr. Grider, on December 21st, who reported: "These mines are nearly worked out. They are in as good condition as could be expected." See Notice 432.

COMMERCIAL COMPANY'S INDIAN CREEK MINE.

At Parker's Lake. P. O. Parker's Lake.

Operated by the Commercial Coal Co., S. W. Grider, General Manager; W. J. LaRue, Superintendent; R. B. Overhuls, Secretary and Treasurer.

Output in bushels for year 1893: All run of mines, 47,175.

This mine was opened in 1893. It was visited in December by Mr. Grider, who reported that it was starting well. Little work had been done.

ROCKCASTLE COUNTY.

Output in bushels for 1893: Lump, 101,084; nut, 91,928; pea, 32,119. Total, 225,131.

Employes for 1893: Maximum, 94; average, 70.

THE PINE HILL MINE.

This mine, which was operated by the Pine Hill Coal and Iron Co., was shut down about the first of August. The output was as given above.

WHITLEY COUNTY.

[Output in bushels of 80 pounds.]

Output for year 1893: Lump, 4, 332,571; nut, 2,205,784; run of mines, 1,492,275; slack, 1,055,482; mixed lump and nut, 1,177,036; pea, 314,724; mixed nut and slack, 769,150; block, 6,975; round, 3,369; "birdeye," 37,911. Total, 11,395,277.

Employes during 1893: Maximum, 1,555. Average, 1,216.

CENTRAL JELLICO MINE.

Near Pleasant View. P. O. Pleasant View.

Operated by the Central Jellico Coal Co., J. P. Mahan, President; T. B. Mahan, Vice President; J. W. Siler, Secretary and Treasurer; John Phillips, Superintendent.

Output in bushels for calendar year 1893: Lump, 389,615; nut, 476,074; slack, 265,359; mixed lump and nut, 138,814; pea, 30,524. Total, 1,300,386.

During the year 16 tenement houses were built, and 40 mine-cars and a revolving screen were added to the equipment.

The last inspection was made on December 2d by Mr. Grider, who reported: "There are four drifts which compose this mine. In all these drifts the air passes up the main entry and back through rooms on the right, missing the rooms on the left of the entry; and many of the latter rooms are up more than 60 feet. Except in one room, the timbering was sufficient. The drainage is good." See Notices 357 and 426.

DOWLAIS COLLIERY.

At Dowlais. P. O. Jellico, Tenn.

Operated by the East Tennessee Coal Co., E. J. Davis, President and General Manager; F. C. Richmond, Secretary and Treasurer; Philip Francis, Superintendent at Mines. Head office, Knoxville, Tenn.

Output in bushels for 1893: Lump, 872,800; nut, 263,650; run of mines, 250,050; slack, 140,175; mixed lump and nut, 13,925; nut and slack, 303,650. Total, 1,844,250.

There are two mines here, a new opening having been made during the past year at a point about one-quarter of a mile from the tip-house. The haulage from the new opening is more than a mile less than from the old mine.

The last inspection was made in November by Mr. Grider, who reported: "There are three drifts. No. 1 has an ample supply of air, but there are some defects in its distribution, and the working places, in several instances, are more than 60 feet in advance of an air-course. In No. 2 the conditions are good. No. 3 is a new opening, with about 30 men employed inside. It is unprovided with artificial means of producing ventilation;

the air is bad. All three drifts are well timbered and drained." See Notices 359, 360 and 422.

JELLICO AMD BIRDEYE MINES.

At Halsey. P. O. Halsey.

Operated by the Jellico and Birdeye Coal Co. No annual report, giving names of officers of the company, was received. B. R. Hutchcraft is General Manager.

Output in bushels for 1893: Lump, 51,936; nut, 21,399; slack, 575; nut and slack, 7,300; round, 3,369; block, 6,975; "birdeye," 37,911. Total, 129,465.

The co-operative feature of this company has been abandoned. The mines were first visited in July. Little coal had been shipped then; only a few tons of "birdeye," which had been hauled by wagon from the drifts and loaded on the railroad cars. The incline to the Vanderpool seam was being graded, and a tipple was being constructed. Several drifts had been opened in the "birdeye" coal—very poorly opened, and without much provision for ventilation. Five of the "birdeye" drifts were examined. No. 1, at the Halsey Gulch, was in about 120 feet. Arrangements were being made to use a fire-grate for ventilation. The average thickness of the coal was 28 or 30 inches. Westwardly from No. 1 are two drifts, known as the "Halsey openings." They were not working. The seam here measured 30 inches, the lower 24 inches being "birdeye" (semi-cannel), and the upper part bituminous coal. The mining was done in the upper bench. The cannel is sometimes a little thicker, and the bituminous a little thinner. It was expected to make an incline, reaching to the railroad, from these drifts. No. 2 "birdeye" drift was in about 700 feet, with 4 side entries started. There was an air-shaft, but it amounted to little, and was closed at the bottom by ashes. The bed here averages from 31 to 33 inches in thickness, and, in addition, there are 4 to 6 inches of "rash" at the bottom. At the head of one of the side entries a thickness of 36 inches was found. No. 3 "birdeye" drift is at the foot of the incline leading from the Vanderpool seam. It consisted (in July) of a main entry in about 200 feet, and a left-hand cross, which had been driven about 150 feet. The bed here averages about 33 inches in thickness. It is nearly all bituminous. Some parts show cannel, and in places the coal has somewhat of the "birdeye" structure. It is understood that the product from this bank is known as "Jellico."

There were three openings in the Vanderpool seam, which occurs at 521 feet above the "birdeye." The No. 3 drift (formerly known as No. 1) was in about 200 feet, and had two short right-hand entries. It was idle. This drift is at the head of the Vanderpool Gap—on the left of it. The coal here averages about thirty-six inches in thickness, with a parting of 1½ to 2 inches at 6 inches from the bottom. On the right of the gap is drift No. 2. It was in about 200 feet. Here the coal also averages about 36 inches, including the parting. No. 1 drift is the main Vanderpool opening. The main entry was in 230 feet, with a right and left entry, both short. The coal at the head of the main entry was said to measure 62 inches (water prevented my measuring it) thus:

a. Coal	26 inches.
b. Parting 0 to	2 inches.
c. Coal	34 inches.

The parting ranges from 1 to 3 inches. In one of the side entries the bed measured 49 inches, thus:

a. Coal	24 inches.
b. Parting	3 inches.
c. Coal	22 inches.

The parting is a slaty material, with a little clay. In some places it is nearly all clay.

The incline leading from the Vanderpool level is 1,500 feet long.

These mines are reached from Jellico by a line of railroad about 7 miles long. The road is called the Jellico, Birdeye and Northern, and is now an independent corporation from the mining company.

The last visit to these mines was made by Mr. Grider, on December 1st. See Notice 425.

MOUNTAIN ASH MINES.

At Mountain Ash. P. O. Mountain Ash.

Operated by the Jellico Coal Mining Co., E. J. Davis, President and General Manager. Arthur Groves, Secretary and

Treasurer John Stone, Superintendent. Head office, Knoxville, Tenn.

Output in bushels for year 1893: Lump, 526,624; nut, 224,868; run of mines, 116,900; slack, 98,782; mixed lump and nut, 154,450; pea, 160,375. Total, 1,281.999.

The last inspection of these mines (in 1893) was made in September. See Notices 355, 356, 383 and 384.

PROCTER MINES.

At Red Ash. P. O. Red Ash.

Operated by the Procter Coal Co., W. E. Grinstead, President; H. C. Grinstead, Secretary and Treasurer; W. T. Lewis, General Manager. Head office, Louisville, Ky.

Output in bushels for year 1893: Lump, 1,263,600; nut, 430,800; run of mines, 224,350; slack, 329,425; mixed lump and nut, 459,900; pea, 82,150; nut and slack, 164,700. Total, 2,954,925.

Coal elevators and revolving screen, having a daily capacity of 750 tons, were erected during the year. See Notices 353 and 354.

THE GRINSTEAD MINE.

At Red Ash. .P. O. Red Ash.

Operated by the Procter Coal Co. (See Procter mines.)

Output in bushels for 1893: Lump, 118,975; nut, 5,100; run of mines, 18,725; slack, 11,375; mixed lump and nut, 67,725; nut and slack, 120,300. Total, 342,200.

This mine was opened in 1893. It was inspected November 30th by Mr. Grider, who reported: The system of ventilation here is very incomplete; it does not cover more than half the mine. The drainage is also imperfect. The timbering is good. See Notice 424.

THE KENSEE MINES.

At Kensee. P. O. Kensee.

Operated by the Main Jellico Mountain Coal Co., Attilla Cox, President; H. V. Saunders, Secretary; Hywel Davies, General Manager.

Output in bushels for year 1893: Lump, 922,425; nut, 357,-

150; run of mines, 158,200; slack, 166,800; mixed lump and nut, 90,475; pea, 41,675; nut and slack, 173,200. Total, 1,909,925.

During the year the company's coal road was relaid with iron and steel rail, and a "Y" was built at the depot to receive L. & N. cars from ingoing trains to Jellico. All wooden bank-rails were replaced with iron and steel ones. The company's locomotive was rebuilt, 50 bank-cars were added to the equipment, and the tenement houses were repaired and improved. A new mine, with special incline, was opened.

The old mines were inspected in August. See Notice 358. The new mine was inspected in November, and found to be well ventilated, timbered and drained. See Notice 423.

THE BRYANT MINE.

Near Pine Knot. P. O. Pine Knot.

Operated by L. E. and D. E. Bryant.

Output in bushels for the year 1893: Lump, 27,694; mixed lump and nut, 251,747. Total, 279,394.

This is a new mine. Drift No. 1 was inspected December 20th by Mr. Grider, who reported: "The mine has no artificial ventilation, and the air is very bad. The drainage is not good. The timbering is passably good." See Notice 431.

STRUNK'S LANE MINE.

At Strunk's Lane. P. O. Strunk's Lane.

Operated by the Pine Knot Coal Co. No report (annual) was received, giving names of the officers.

Output in bushels for the year 1893: Lump, 158,949; nut, 426,743; run of mines, 724,050; slack, 42,991. Total, 1,352,733.

The mine was inspected December 18th by Mr. Grider, who reported: "The timbering and drainage is moderately good. The mine is supplied with a fan of ample power, but the air is not conducted to some of the working-places, a number of which are more than 60 feet ahead of an air-way." See Notice No. 430.

WESTERN DISTRICT.

Output of bituminous coal, in bushels. for 1893, 44,889,672.

Output of cannel, in tons, for 1893, 4,205.

Employes for 1893: Maximum, 4,943; average, 3,882.

BUTLER COUNTY.

Output in bushels for year 1893: Lump, 353,343; nut, 127,130; slack, 81,155. Total, 561,628.

Employes for year 1893: Maximum, 73; average, 59.

ABERDEEN MINE.

At Aberdeen. P. O. Morgantown.

Operated by the Aberdeen Coal and Mining Co., I. B. Wilford, President; J. D. Render, Secretary; E. P. Aspley, Treasurer.

Output was as given above.

Except in the way of buildings, there were few improvements at the mines during the year.

The last inspection was made by Mr. Grider in November. It was found to be in very good condition. See Notices 377 and 402.

CHRISTIAN COUNTY.

Output in bushels for year 1893: Lump, 532,150; nut, 88,425; run of mines, 102,129; slack, 169,081. Total, 891,785.

Employes for 1893: Maximum, 118; average, 89.

EMPIRE MINE.

At Empire. P. O. Empire.

Operated by the Empire Coal & Mining Co., John D. Anderson, President; J. B. Richardson, Vice-President; W. T. Rutland, Manager and Treasurer.

Output for 1893 was as given above.

This mine was inspected August 28th by Mr. Grider. He reported: "North of the shaft this mine was in very fair condition; to the south it was defective, both in ventilation and timbering." See Notice 371.

DAVEISS COUNTY.

Output in bushels for 1893: Lump, 280,406; nut, 42,785; run of mines, 8,150; slack, 48,685; mixed lump and nut, 800; nut and slack, 16,357. Total, 397,183.

Employes for 1893: Maximum, 61; average, 43.

BRUCKS' MINE.

Near Owensboro. P. O. Owensboro.

Operated by A. R. Brucks, Lessee.

Output in bushels for 1893: Lump, 19,500; nut, 5,650; slack, 4,150. Total, 29,300.

This mine was inspected in September by Mr. Grider, who reported: "The mine is in very good condition as to timbering and drainage. Some very slight repairs will render its ventilation good. There were no safety-catches or cover on the hoisting cages used for men." See Notice 380.

NALL'S MINE.

Near Owensboro. P. O. Owensboro.

Operated by C. L. Nall, Proprietor.

Output in bushels for 1893: Lump, 122,470; nut, 23,803; run of mines, 2,450; slack, 31,555. Total, 180,278.

The last inspection of this mine was made by Mr. Grider in September. He reported the underground condition as to ventilation, etc., to be good. The safety-catch which had been applied to one of the cages, however, was condemned. See Notices 334 and 379.

NEW HOLLAND MINE.

Near Owensboro. P. O. Owensboro.

Operated by H. G. Simmons.

Output in bushels for 1893: Lump, 138,436; nut, 13,332; run of mines, 5,700; slack, 12,980; mixed lump and nut, 800; nut and slack, 16,357. Total, 187,605.

The last inspection (in 1893) of this mine was made by Mr. Grider in September. The drainage was good, but the timbering was insufficient, and there was no ventilation. See Notice 382.

HANCOCK COUNTY.

Output of bituminous coal in bushels for 1893: Lump, 361,507; nut, 68,575; run of mines, 15,250; slack, 27,125. Total, 472,457.

Output of cannel for 1893 in tons, 4,205.

Employes for 1893: Maximum, 189; average, 133.

FALCON MINE.

At Falcon. P. O. Hawesville.

Operated by the Hawesville Coal Co., W. S. Morrison, President; I. C. Adair, Secretary and Treasurer; John S. Adair, Superintendent.

Output for 1893 in bushels: Lump, 352,932; nut, 66,875; run of mines, 15,250; slack, 27,125. Total, 462,182.

A new opening has been made to the mine. During the year 1,100 feet of tramway, laid with T-rail, and a tipple with triple screens were built.

The last inspection was made in September by Mr. Grider, who reported: "Since the last inspection (July 12th) entries have been driven through the hill from daylight to daylight, and the operators were depending wholly upon natural ventilation. The air in the mine is very bad; the drainage is miserable." See Notices 348 and 381.

HINKEL MINE.

Near Petrie Station. P. O. Petrie Station.

Operated by Smith & Ford. (Present address, W. I. Smith, Box 85, Cannelton, Indiana.)

Output in bushels for year 1893: Lump, 8,575; nut, 1,700. Total, 10,275.

The coal worked here is the first one shown above the limestone in the Hancock section. At this place its position ranges from 30 to 45 feet above the limestone. It is 38 inches thick.

Messrs. Smith & Ford propose transferring their operations to a point nearer the railroad—this mine is three-fourths of a mile from the station—and expect to there work both the limestone coal, which is 38 inches thick there, and the seam now wrought.

Operations have been suspended temporarily.

HENDERSON COUNTY.

Output in bushels for 1893: Lump, 1,425,850; nut, 319,882; run of mines, 711,363; slack, 222,653; mixed lump and nut, 7,300; pea, 64,650; pea and slack, 6,817; "mixed and nut," 14,150. Total, 2,772,665.

Employes for 1893: Maximum, 346; average, 258.

BASKETT MINE.

At Baskett. P. O. Baskett.

Operated by the Baskett Coal Co., C. L. Nall, President; R. S. Eastin, Secretary and Treasurer.

Output in bushels for 1893: Lump, 775,750; nut, 128,525; run of mines, 191,775; slack, 178,050; mixed lump and nut, 3,300; "mixed and nut," 14,150. Total, 1,291,550.

This mine was inspected last in November by Mr. Grider, who reported: "The doors and curtains throughout this mine have been so neglected that air fails to reach most of the working places. Timbers were not kept close enough to the working-faces. The drainage was good. There were no safety-catches on the hoisting cages, and no gate at the top of the shaft."

The underground management of this mine has been very poor indeed, and the least attention possible was paid to the mining law. The mine had been provided with safety-catches, and there was no good reason for their being unused for any considerable time. So long as there was but one Inspector, advantage was taken of the fact by the underground manager. This will no longer be possible, and the disregard for the mining law which has distinguished the past will not be tolerated. See Notices 329 and 415.

During the year the shaft was retimbered, three coal bins and six dwellings were built. A new fan and a new engine for the mine pump were procured.

HENDERSON MINE.

At Henderson. P. O. Henderson.

Operated by the Henderson Mining and Manufacturing Co., C. W. Wilson, President; A. B. Sights, Secretary and Treasurer.

Output in bushels for 1893: Lump, 126,556; nut, 73,711; run of mines, 143,467; slack, 33,394; pea, 46,200.

The last inspection of this mine was made in July, when the underground conditions were found to be satisfactory. The safety-catches and the drum-brake needed strengthening. See Notices 333 and 349.

SPOTTSVILLE MINE.

At Spottsville. P. O. Spottsville.

Operated first part of year by T. Shiver & Bro., and the last half by the Green River Coal Co. Officers are: Frank Shiver, President; George Goodall, General Manager.

Output in bushels for 1893: Lump, 426,380; nut, 97,390; run of mines, 375,926; mixed lump and nut, 4,000; pea, 18,450. Total 922,146.

This mine was last inspected on November 14th. At that time the air, which is supplied by a fan of ample capacity, was not satisfactorily conducted to the working-places. The main entry needed timbering in two places. The bank was well drained. The indications are that under the new management this mine will be kept in better condition than hitherto. See Notice 414.

CORYDON MINE.

At Corydon. P. O. Corydon.

Operated by the "Corydon Coal Co.," (B. M. Powell, Proprietor).

Output in bushels for 1893: Lump, 69,715; nut, 12,712; run of mines, 11,049. Total, 93,476.

This mine was last inspected in November by Mr. Grider, who reported the condition of the mine as satisfactory. See Notice 416.

During the year a new 42-inch boiler and a number of mine cars were added to the equipment, and the main and first right entries were laid with T-iron.

PEOPLE'S MINE.

Near Henderson. P. O. Henderson.

Operated by the Jorris-Bartley Mining Co., H. G. Jorris, Manager; P. Bartley, Superintendent.

Output in bushels for 1893: Lump, 27,449; nut, 7,544; run of mines, 195; slack, 160; pea and slack, 6,817. Total, 42,165.

This mine was operated but a short time during 1893, the output being only for the last three months, the present company (successor to P. J. McNamara) having had control only during the last half of the year, and much repairing and refitting being necessary before mining could again be carried on.

The last inspection notice (No. 328) was served in February, during Mr. McNamara's term of lease. Subsequently Mr. McNamara was fined, after which the mine was closed until the present company secured control. The mine has been visited twice since the present company has had possession. On the first occasion mining had not been resumed; on the second, the bank was idle.

HOPKINS COUNTY.

Output in bushels for 1893: Lump, 6,633,794; nut, 2,253,408; run of mines, 1,409,003; slack, 962,770; mixed lump and nut, 5,065,102; pea, 182,926; nut and slack, 422,495; pea and slack, 1,572,689; mixed lump, nut and pea, 524,676. Total, 19,026,863.

Production of coke, in tons, 34,813.

Employes for 1893: Maximum, 1,925; average, 1,586.

CARBONDALE MINE.

Near Hamby. P. O. Hamby Station.

Operated by the Carbondale Coal and Coke Co., E. C. Horn, President; John W. Kearny, Jr., Secretary and Treasurer; Samuel McElfatrick, General Manager.

Output in bushels for 1893: Lump, 70,783; nut, 21,190; run of mines, 4,500; slack, 2,500. Total, 98,973. (This is according to monthly reports received by this Department. A note in the company's annual report is to the effect that 102,500 bushels were shipped.)

This is a new mine, opened and equipped during the year. The tipple is connected with the C., O. & S. W. Railroad by a spur about a mile long, and the tipple is connected with the bank by a tramway about 1,500 feet long. On December 18th the main entry and air-course were in 700 feet, and cross-entries were up 200 feet.

Woodstock Mine.

At Barnsley. P. O. Barnsley.

Operated by the Co-operative Mining and Manufacturing Company of Hopkins County, Kentucky. Officers are: J. H. Brown, President; S. Platt, Secretary and Treasurer; P. May, Superintendent; A. Bennewitz, Geo. Wade, Jas. Green, John Dunning and Ellis Hand, Directors.

Output in bushels for 1893: Lump, 349,504; nut, 109,115; run of mines, 290,319; slack, 116,300. Total, 865,238.

This mine was formerly, and is now commonly, known as the Co-operative.

The last inspection was made in August by Mr. Grider, who reported: "There was enough air passing into the mine, but it was not properly distributed. In most of the mine, the drainage and timbering were fair, but in part, both were very bad." See Notice 369. It is reported since that notice was given that the stoppings have been repaired, and that doors have been hung in other parts of the mine.

Crabtree Mine.

Near Ilsley. P. O. Ilsley.

Operated by the Crabtree Coal Mining Company, A. Howell, President; R. M. Salmon, Secretary and Treasurer.

Output in bushels for 1893: Lump, 552,150; nut, 193,683; run of mines, 142,690; slack, 238,503; mixed lump and nut, 419,848. Total, 1,546,874.

A new air-shaft was sunk, a new furnace was built, and a steam pump for draining the mine was put in during the year.

Earlington "No. 9" and "No. 11" Mines.

At Earlington. P. O. Earlington.

Operated by the St. Bernard Coal Co., E. G. Sebree, President; John B. Atkinson, Vice-President and Treasurer; G. C. Atkinson, Secretary.

Output in bushels for 1893: Lump, 1,932,840; nut, 654,883; mixed lump and nut, 2,763,120; pea and slack, 929,882; nut and slack, 3,250. Total, 6,283,975.

Coke produced and shipped in 1893, in tons, 34,813.

Vibrating screens were put in and a track for loading box-cars was built during the year.

These mines were inspected by Mr. Grider in August, who reported that in each mine the ventilation, drainage and timbering were good. See Notices 364 and 365.

DIAMOND MINE.

Near Morton's Gap. P. O. Morton's Gap.

Operated by the St. Bernard Coal Co. (See Earlington Mines.) P. O. of company is Earlington.

Output in bushels for year 1893: Lump, 629,125; nut, 309,100; mixed lump and nut, 934,796; nut and slack, 199,194; pea and slack, 316,006. Total, 2,388,221.

This mine was examined by Mr. Grider in August, and found to be in excellent condition in all respects. See Notice 366.

ST. CHARLES MINE.

At St. Charles. P. O. St. Charles.

Operated by the St. Bernard Coal Co. (See Earlington Mines). P. O. of company is Earlington.

Output in bushels for 1893: Lump, 1,385,156; nut, 369,650; mixed lump and nut, 578,341; nut and slack, 220,051; pea and slack, 326,801. Total, 2,879,999.

A vibrating screen was added to the equipment during the year.

Mr. Grider inspected this mine in August, and reported the ventilation, timbering and drainage to be excellent. See Notice 367.

HECLA MINE.

Near Earlington. P. O. Earlington.

Operated by the Hecla Coal and Mining Co., Jo. F. Foard, President; W. F. Anderson, Secretary and Treasurer.

Output in bushels for 1893: Lump, 471,583; nut, 165,126; run of mines, 602,727; slack, 177,381; mixed lump and nut, 1,400. Total, 1,418,217.

This mine was inspected by Mr. Grider in August, and again in November. After the last inspection he reported that the condition of the mine had been greatly improved, and was quite satisfactory. See Notices 368 and 411.

ROBERTSON'S PEACOCK MINE.

Near Earlington. P. O. Earlington.

Operated by J. L. M. Robertson and Son.

Output in bushels for 1893: Lump, 41,735; nut, 10,325; run of mines, 1,000; slack, 8,150. Total, 61,210.

When inspected on November 9th, by Mr. Grider, the mine was without artificial ventilation, and was not well timbered. The drainage was good. See Notice 412.

Mr. Robertson, when his attention was directed to the requirements of the mining law, has claimed that he did not work the requisite number of persons to bring him subject to its provisions. But at the time the mine was inspected by Mr. Grider, six miners and a driver were employed inside; and on other occasions, there have been as many as nine persons employed inside. The question will doubtless have to be referred to the courts.

MADISONVILLE MINE.

Near Madisonville. P. O. Madisonville.

Operated by the Madisonville Coal Company, Chesley Williams, President; C. E. Morton, Secretary and Treasurer; R. S. Dulin, Superintendent.

Output in bushels for 1893: Lump, 306,297; nut, 146,576; run of mines, 177,605; slack, 178,730. Total, 809,208.

When inspected in November this mine was in fairly good condition. See Notice 408.

REINECKE MINE.

Near Madisonville. P. O. Madisonville.

Operated by the Reinecke Coal Co., Conrad Reinecke, President; Inkerman Bailey, Secretary and Manager; Louis Feger, Superintendent.

Output in bushels for 1893: Lump, 750,115; nut, 258,410;

run of mines, 164,737; slack, 199,200; mixed lump and nut, 363,697; pea, 182,926; mixed lump, nut and pea, 524,676. Total, 2,443,761.

During the year a vibratory screen, with picking table attachment, was put in. The screen is operated by a 15 H.-P. engine. The company is making an experiment with long-wall mining. The success of the experiment is still a question.

When inspected in November the mine was in fairly good condition. See Notice 409.

OAK HILL MINE.

Near Nortonville. P. O. Nortonville.

Operated by Oak Hill Coal and Mining Co., L. F. Stull, Secretary, etc.

Output in bushels for 1893; Lump, 144,506; nut, 15,350; run of mines, 25,425; slack, 42,006; mixed lump and nut, 3,900. Total, 231,187.

This mine has been operated in a rather desultory fashion during the year. When inspected by Mr. Grider, in August, it was in a very defective condition in all respects. (See Notice 370.) When visited by the writer in December it was not in operation, being temporarily idle. An air-shaft has been sunk. Measures will be taken to secure full compliance with the law so long as the mine is subject to it.

McLEAN COUNTY.

Output in bushels for 1893: Lump, 42,574; nut, 11,243; run of mines, 4,950; slack, 15,558; mixed lump and nut, 3,450. Total, 77,775.

Employes for 1893: Maximum, 52; average, 23.

McKENNEY & STANLEY'S MINES.

Near Island. P. O. Island.

Messrs. McKenney & Stanley have for various parts of the year operated three mines, namely: Robinson, No. 1 and No. 2, and the Island. When visited in July the Robinson No. 1 and No. 2 were not subject to the mining law. Less than five persons were employed in No. 1, which had been leased to J. W. Hedrick, and No. 2 had been abandoned.

The Island Mine—a shaft mine—was the principal mine. It had been opened for mining but a short time. It was entirely without ventilation. (See Notice 350) The mine was again visited in September by Mr. Grider, who reported that since no work was being done in the mine he did not inspect the underground works. Since the former visit the hoisting shaft had been completed and connected with the air-shaft. At the bottom of the air-shaft a pump had been placed, and dependence was placed upon the exhaust steam for producing ventilation. Even under favorable circumstances the exhaust from a steam-pump is an uncertain means for producing a satisfactory ventilating pressure, and in the case of an unlined air shaft, as is true of nearly all in Kentucky, it is practically of no service. In this instance, however, if properly managed, it may serve for awhile. See Notice 378.

MUHLENBERG COUNTY.

Output in bushels for 1893: Lump, 2,086,038 ; nut, 592,059 ; run of mines, 1,217,173 ; slack, 925,988 ; mixed lump and nut, 2,656,297 ; pea, 189,818 ; "mixed and steam," 750 ; "steam," 224,981. Total, 7,893,104.

Employes for 1893: maximum, 854 ; average, 671.

CENTRAL MINE.

At Central City. P. O. Central City.

Operated by the Central Coal and Iron Company, Bannen Coleman, President ; T. C. duPont, Vice President ; Spalding Coleman, Secretary ; W. H. Beynroth, Auditor ; F. M. Haines, Superintendent. Head office, Louisville.

Output in bushels for 1893 : Lump, 438,113 ; nut, 216,022 ; run of mines, 315,812 ; slack, 473,952 ; mixed lump and nut, 1,327,710. Total, 2,771,609.

During the year a new Dean mine pump (capacity 1,000 gallons per minute) and boiler have been added to the equipment. A new double direct-acting engine was put in, and chutes built for supplying coal for railroad engines.

The last inspection was made by Mr. Grider, in August. He reported: "The supply of air was insufficient. The timbering was giving way in many places, but four men were at work retimbering." See Notice 375.

DOVEY'S MINE.

At Mercer Station. P. O. Mercer Station.

Operated by William H. Dovey.

Output in bushels for 1893: Lump, 92,587; nut, 67,550; run of mines, 240,835; slack, 99,365; mixed lump and nut, 273,469. Total, 773,806.

The mine was found to be in bad condition, in all respects, when inspected by Mr. Grider in August. "The mine was in bad condition throughout as to ventilation, drainage and timbering. The safety catches on the cages were not good, and one of the cages had no cover." See Notice 372."

It is claimed in the proprietor's annual report that the mine was generally improved as to timbering, etc., during the year! On January 15, 1894, the roof of the mine caved in, allowing a vast quantity of water to enter, cutting off work entirely, and necessitating the sinking of a new shaft. No loss of life. This occurrence did not surprise the writer. More than once Mr. Dovey's attention has been called to the fact that he was cutting his pillars too thin and not putting enough timber in the mine—that a continuance of the practice would probably cause a collapse. In Notice 311 (given in Report for 1892), for example, attention was called to lack of timbering, and the following statement was made: "On account of the many slips in this coal, the necessity for thoroughly timbering the excavations is greater than otherwise would be the case. The old timbering on the main entry should be replaced by new. In many places it serves only to hold up loose dirt, and as the cross-timbers are rotten and breaking, the conditions are dangerous." The fact was also noted that there was "a tendency not to set sufficient props in the rooms, and not to keep the props close enough to the faces." Insufficient timbering and thin pillars, with plenty of water, lead to but one result. It is not at all improbable that the pillars had in some places been sliced so greatly that, when it had once started, not even a "forest" of props would have held back the roof.

HILLSIDE MINE.

At Hillside. P. O. Mercer Station.

Operated by the Hillside Coal Co. In the annual report of the company only one officer is named: J. W. Lam, Secretary and Treasurer.

Output in bushels for year 1893: Lump, 334,750; nut, 74,004; run of mines, 85,009; slack, 133,375; mixed lump and nut, 208,765. Total, 835,903.

When inspected in August the mine was found to be in good condition in every respect. See Notice 373.

MEMPHIS MINE.

At Bevier. P. O. Bevier.

Operated by the Memphis Coal & Mining Co., H. M. Neely, President; W. H. Moore, Secretary; J. W. Moores, Superintendent and General Manager. Head office, Memphis, Tenn. Address of General Manager, Bevier.

Output in bushels for 1893: Lump, 170,599; nut, 40,734; run of mines, 265,845; slack, 170,796; mixed lump and nut, 661,819. Total, 1,309,793.

The mine was visited twice during the year. On each occasion it happened to be idle for the day. It was inspected in July (though idle at the time) by Mr. Grider, who found the ventilation satisfactory, and the drainage fairly good. The roof of the third west entry was condemned as unsafe. See Notice 351.

MUD RIVER MINES.

At Mud River. P. O. Mud River.

Operated by the Mud River Coal, Coke and Iron Co., Isaac Litt n, President; Jno. C. Gordon, Vice President; W. G. S. Anderson, Secretary and Treasurer.

Output in bushels for 1893: Lump, 472,204; nut, 96,200; pea, 80,525. Total, 648,929.

The mine was visited twice during the year. On one occasion it was idle for the day. In August it was inspected by Mr. Grider, who reported: "Since the former inspection of this mine, a new air-shaft has been sunk near the face of Davis entry, and a new furnace built. The mine had ample ventilation, and good drainage and timbering." See Notice 376.

PARADISE MINE.

At Paradise. P. O. Paradise.

Operated by J. Wm. Jones, Lessee.

Output in bushels for 1893: Lump, 12,307; nut, 6,064; run of mines, 45,024; pea, 3,611. Total, 67,006.

This is a small mine, in which an average of only 7 persons (5 being diggers) were employed in 1893. The maximum number inside was 9.

PIERCE "NO. 9" MINE.

At Drakesboro. P. O. Drakesboro.

Operated by the Black Diamond Coal Co., Jas. T. Pierce, President; H. W. Buttorff, Vice-President; Robert T. Hopkins, Secretary; C. G. Smallhouse, Treasurer.

Output in bushels for 1893: "Lump, 251,837; nut, 65,760; run of mines, 247,023; mixed lump and nut, 23,547; pea, 88,557; "mixed and steam," 750; "steam," 80,568. Total, 758,042.

This mine was visited twice during the year. On one occasion it was idle for the day. When inspected in July the drainage and ventilation were satisfactory. See Notice 352.

POWDERLY MINE.

At Powderly. P. O. Powderly.

Operated by the Greenville Coal Co., Lewis Reno, President; Edgar D. Martin, Vice-President; I. J. Kahn, General Manager; C. H. Hamilton, Superintendent.

Output in bushels for 1893: Lump, 313,641; nut, 25,725; run of mines, 17,625; slack, 48,500; mixed lump and nut, 160,987; pea, 17,125; "steam," 144,413. Total, 728,016.

It may be well to state, in order that an erroneous impression may be corrected, that this mine is no longer worked on the co-operative plan. It was opened, and for some time worked, by a co-operative association of miners, members of the order of Knights of Labor, the title of the association being the Greenville Co-operative Mining and Manufacturing Co., but this has been succeeded by the company named above.

Aside from the erection of a number of houses, there were no important additions to the plant. An additional tract of coal (12 acres) was purchased during the year.

The mine was not in good condition when inspected in August, by Mr. Grider, who reported: "The ventilation of this mine was insufficient. Its timbering and drainage, though not very bad, should be somewhat improved. The Greenville Coal Co. has had the property but a short while. It seems to be the company's intention to put the mine in good condition. Material for a new furnace was in place." See notice 374.

OHIO COUNTY.

Output in bushels for 1893: Lump, 3,836,542; nut, 949,610; run of mines, 1,176,410; slack, 934,339; mixed lump and nut, 875,258; pea, 357,756; "steam," 736,842. Total, 8,866,757.

Employes for 1893: Maximum, 839; average, 712.

DEANEFIELD MINE.

At Deanefield. P. O. Ætnaville.

Operated by D. Stewart Miller, Lessee.

It has been difficult to keep informed concerning the operations of this mine during the past year. No reports have been received since June. The mine was visited in September by Mr. Grider, who was informed that work was suspended July 14th. Whether it has been resumed at any time since is not known. Mr. Miller has ignored all blanks for monthly reports sent him since June, and has treated letters of inquiry in the same fashion, with about two exceptions, when, with apologies for his neglect, promises were made to give immediate attention to his duty, which promises were never kept. As soon as it can be determined what the situation has been at the mines, all proper measures will be taken.

THE GAINES MINE.

Near Fordsville. P. O. Fordsville.

Operated by the Gaines Coal Co., a firm composed of W. S. Gaines, (President, etc.), and W. O. Read, (Vice-President, etc.)

Output in bushels for year 1893: Lump, 55,500; nut, 7,625; run of mines, 1,700; slack, 4,275; mixed lump and nut, 19,662. Total, 88,762.

The mine was partially closed by a crush during the year, and a new opening became necessary. This has been completed, and some of the old works left standing have been reached. The mine was visited by Mr. Grider in September, but it was idle, and had been for some days.

McHENRY MINE.

At McHenry. P. O. McHenry.

Operated by the McHenry Coal Co., W. G. Duncan, President; H. McHenry Eskridge, Secretary; C. W. Taylor, Superintendent. Head office, 427 W. Jefferson street, Louisville, Kentucky.

Output in bushels for 1893: Lump, 543,505; nut, 203,779; run of mines, 909,060; slack,· 113,740; mixed lump and nut, 287,359; pea, 88,006. Total, 2,145,449.

The mine was inspected in November. See Notice 406.

ECHOLS MINE.

At Echols. P. O. Echols.

Operated by the McHenry Coal Company. (See McHenry mine.)

Output in bushels for 1893: Lump, 417,108; nut, 221,684; run of mines, 90,055; slack, 148,827; mixed lump and nut, 96,570. Total, 974,244.

The mine was inspected on November 18th by Mr. Grider, who reported: "The supply of air entering this mine is insufficient for the number of men employed underground. The timbering and drainage are good." See Notice 418.

Many improvements have been made at this mine during the year. Twenty-one cottages were built, and twenty bank cars added to the equipment.

TAYLOR MINE.

Near Beaver Dam. P. O. Taylor Mines.

Operated by the Taylor Coal Company of Kentucky, J. B. Speed, President; I. P. Barnard, Superintendent; W. A. Jones, Secretary and Treasurer. Head office, Louisville, Ky.

Output in bushels for 1893: Lump, 1,358,552; nut, 386,625; slack, 17,500; mixed lump and nut, 175,375; pea, 269,750. Total, 2,207,802.

The mine was inspected by Mr. Grider in November. An ample ventilating current was entering the mine, but there were defects in conducting it. The timbering and drainage were good. See Notice 421.

THE WILLIAMS MINE.

Near McHenry. P. O. McHenry.

Operated by the Williams Coal Co., E. J. Williams, President; J. S. Williams, Secretary and Treasurer; Samuel James, Mine Superintendent.

Output in bushels for 1893: Lump, 332,762; nut, 51,172; run of mines, 151,432; slack, 131,972; mixed lump and nut, 113,842; "steam," 25,267. Total, 806,447.

When inspected in November the mine was well ventilated, timbered and drained. See Notice 420.

THE RENDER MINE.

At Hamilton. P. O. McHenry.

Operated by the Central Coal & Iron Co., Bannon Coleman, President; T. C. duPont, Vice President; Spalding Coleman, Secretary; W. H. Beynroth, Auditor; F. M. Haines, Superintendent. Main office, 410 W. Main St., Louisville, Ky.

Output in bushels for 1893: Lump, 1,026,313; nut, 62,225; run of mines, 12,609; slack, 499,025; mixed lump and nut, 182,450; "steam," 711,575. Total, 2,494,197.

During the year two new boilers were put in. An Ingersoll compressor, with two Jeffrey coal-cutting machines, were put in on trial, with intention of increasing the plant if successful.

The mine was inspected by Mr. Grider in November, who reported that there was an ample volume of air entering the mine, but some small defects in its distribution. The timbering was sufficient, except at one point. The drainage was good. See Notice 419.

UNION COUNTY.

Output in bushels for 1893: Lump, 1,491,141; nut, 581,093; run of mines, 536,320; slack, 262,169; mixed lump and nut, 5,500; pea, 149,050; nut and pea, 6,700. Total, 3,031,973.

Employes for 1893: Maximum, 363; average, 230.

DAVIDSON'S MINE.

Near Uniontown. P. O. Uniontown.

Operated by Davidson & Sons, B. C. Davidson, Manager.

Output in bushels for 1893: Lump, 106,559; nut, 20,397; run of mines, 900. Total, 127,856.

The mine was inspected in November by Mr. Grider, who reported: "Enough air was entering the mine, but the working places are far ahead of the air-courses. No timbering is done, though the roof is standing well. The drainage is good." See Notice 417.

THE STURGIS MINE.

Near Sturgis. P. O. Sturgis.

Up to November 15th, this mine was operated by the Sturgis Coal and Coke Co. Since that date it has been operated by Jordan Giles, Lessee.

Output in bushels for 1893: Lump, 302,775; nut, 146,725; run of mines, 226,225; slack, 89,525. Total, 765,250.

A second outlet has been required at this mine since February 10th, 1893, at which date, so well as could be determined from a map of the mine (then recently made), personal measurements, and the output, at least 15,000 square yards had been excavated. My estimates showed 16,000 square yards. The necessary notice was given at once. Subsequently under the impression that another shaft was to be put down at a point that would require the driving of an entry about 450 or 500 feet long, which I believed could not all be done (the sinking of the shaft and driving of entry) within the sixty days first allowed—no matter how energetically the work might be pushed forward—I assured F. C. Mills, then President, that if the work was energetically carried on—as he represented would be done—he could count upon my extending the time up to the limit of sixty days longer, in the event that, despite such exertions, the second outlet could not be completed sooner. Said extension limited the time within which the second outlet should be completed to June 10th or 17th, depending upon the date from which the count was to be made. When this assurance was given, I was distinctly under the impression that the second outlet was to be a shaft, to be reached by an entry about 450 or 500 feet long, concerning which I had talked with J. E. Downing, then Superintendent; and I understood that work upon it was then in progress. A pressure of work in other directions prevented my revisiting the mine again until November 16th, but I was under the impression until two days before that date that the second outlet had been made. It was then discovered that instead of sinking the shaft, as I was given to understand was to be done, the work towards securing the outlet consisted of extending an entry a distance of about 1,700 feet westward from the point where it stood on February 9th, (the date of the preceding inspection), with a view to then make a connection with the Tate slope, still distant about 900 feet. This distance could not possibly have been driven in the limit of time allowed by me (for a different piece of work), and that it could not be must have been known by the officials in charge of the mine at the time they commenced the work. On November 16th there still remained, according to rough calculations, about 900 feet to be driven to make connection with the slope. The necessary affidavits to secure the indictment of the company for failure to comply with the law were promptly filed with the Commonwealth's Attorney; but I was subsequently informed by him that they reached him too late to be presented to the grand jury at the November term—the jury had been discharged. Col. Giles took charge of the mine as Lessee on November 15th. A notice was at once given him that a second outlet must be made. The time in which he had to comply with the Notice expired in January of the present year (1894), and the outlet still had not been made. The necessary affidavits touching his case will also be filed with the Commonweath's Attorney, and it is hoped that the delinquency of the Sturgis Coal and Coke Co., and of Col. Giles, will receive due attention at the coming term of the Union Circuit Court. The failure to make a second outlet for this mine, in parts of which fire-damp is constantly being evolved. has been not only a trifling with the law, but a flagrant disregard for the welfare of the employes engaged underground. See Notices 332 and 407.

The Cumberland Mine.

Near Sturgis. P. O. Sturgis.

Operated by the Cumberland Coal Co., W. W. Smith, President; Isaac Reese, Secretary and Treasurer; G. H. McCartney, Superintendent.

Output in bushels for 1893: Lump, 482,927; nut, 194,421; run of mines, 51,611; slack, 150,717; mixed lump and nut, 1,350. Total, 881,026.

During the year a larger and more efficient engine and a better drum were substituted for the old ones. Revolving screens were added to the equipment, and the storage track was enlarged.

When inspected in November the ventilation of the mine was defective. See Notice 410.

The DeKoven Mines.

Near DeKoven. P. O. DeKoven.

Operated by Ohio Valley Coal & Mining Co., Samuel S. Brown, President; Samuel P. Sturgis, Secretary; John Whitehead, Superintendent of Mines.

Output in bushels for 1893: Lump, 302,775; nut, 146,725; run of mines, 226,225; slack, 89,525. Total, 1,257,841.

This company operates three mines. Two are worked from a single slope. They are in what are known as the "Three-foot" and the "Four-foot" coals (Nos. 5 and 6 of Owen), which are here about 41 feet apart. The third is a slope in "No. 9," or "D" coal. The three were inspected in November. See Notices 403, 404 and 405.

The coke plant now building here has already been noticed.

WEBSTER COUNTY.

Output in bushels for 1893: Lump, 274,388; nut, 108,597; run of mines, 106,515; slack, 94,662; mixed lump and nut, 226,833; pea, 82,487. Total, 893,482.

F[illegible] for 1893: Maximum, 115; average, 70.

THE PROVIDENCE MINES.

Near Providence. P. O. Providence.

Operated by the Providence Coal Company, E. B. Hayden, President; W. L. Barnes, Secretary; W. A. Nesbet, F. D. Ramsey and E. B. Hayden, Directors.

The company operates two mines, a drift (No. 1) and a shaft (No. 2.) The output for 1893 is given above.

Mine No. 1 was inspected by Mr. Grider in November. No. 2 was idle at the time. See Notice No. 413.

XII.

INSPECTION NOTICES SERVED.

In addition to verbal directions, 106 written Inspection Notices have been served since the last Report; of these, 102 were served during the calendar year 1893. In compliance with the law, as showing, in part, "the proceedings" of the Department, they are given below. Those notices bearing the initials "W. U. G." were served by Mr. W. U. Grider, Assistant Inspector; the others were served by the Chief.

Hereafter, only a summary of each Notice will be given. With the additional force of the Department, the number of Notices served each year will be so greatly increased that to give them *in extenso* will add too much to the bulk of the Report, and, perhaps, serve rather to confuse than to enlighten.

It is deemed well to repeat the remarks made in preceding Reports:

"These Notices do not, of course, indicate the usual, or even the average, condition of a mine, but only its state at the time of inspection. A mine usually in a fair condition may be found defective, either in whole or in part, at the time of inspection, and shortly thereafter be placed in excellent shape; or one in good condition, on the day of inspection, may soon thereafter become the reverse; or a mine found defective may be placed in such condition as the Inspector's Notice indicates to be necessary, and again become defective before the Inspector can visit it again. . . . . It may be well to state that the expressions 'no ventilation' and 'no air' do not always indicate the actual impossibility of working, for a limited time, in the place referred to. The atmosphere of the place may be sufficiently modified by diffusion to enable the miner to endure to work there for a time . . . but it will be at the expense of his health. A place 'not ventilated,' or which has 'no air,' is one which the ventilating current does not reach to freshen the vitiated atmosphere and *carry away* the mephitic exhalations; and the measure of the evil depends, as a rule, upon the remoteness of the place from the flowing air.

"When Bank Committees, to represent the miners as a body, are recognized by the Operator, they are also recognized by the Inspector, and, upon request, are provided with copies of inspection reports."

Following are the notices served:

THE NOTICES.

No. 328.

People's Mine.

No. 328 (C. J. N.). Frankfort, October 15, 1892.

To P. J. McNamara, Esq.,
Henderson, Ky.

Dear Sir: You are hereby respectfully notified that on October 13, 1892, the date of inspection, an examination of the hoisting machinery of your mine, the "People's," near Henderson, showed it to be in the following condition, with respect to safety devices, in violation of the mining law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The wire rope on the left side of the shaft (looking from the engine house, having broken, and a hemp rope with counterbalance being used there temporarily, only one cage is now in use. This cage has no safety-catches and no cover.

There are no safety-gates at the mouth of the shaft.

I am aware of the fact that there are now only three persons working in the mine; but I also understand that this is only a temporary matter, that there will be more when they can be procured, and that there would be more now were the conditions favorable.

Letter accompanying the above:

FRANKFORT, KY., October 17, 1892.

P. J. McNamara, Esq.,
Henderson, Ky.

DEAR SIR: I inclose Notice 328, relating to your mine. You stated to me in Henderson, last Thursday, that you had written to me the day before. I find nothing whatsoever here from you.

Respectfully,
C. J. NORWOOD,
State Inspector of Mines.

No. 329.

BASKETT MINE.

No. 329 (C. J. N). FRANKFORT, October 17, 1892.

To. C. L. Nall, Esq.,
President Baskett Coal Co.,
Baskett, Ky.

DEAR SIR: You are hereby respectfully notified that on October 14, 1892, the date of inspection, an examination of your mine, the Baskett, showed it to be in a defective condition, as indicated below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Ventilation. The ventilation is quite defective, especially on the south side.

The volume of air is not sufficient for either side, and what there is is not so conducted as to reach all the working places, where the diggers are, and keep within 60 feet or less than the faces.

The latter defect is due to the failure to provide the necessary. curtains and keep the worked-out roads "stopped" off. Too many openings are left for the air to meander through the worked-out places; there is, therefore, a constant loss of air and the current fails to reach the furthermost parts, where it is needed, in sufficient volume. This general criticism applies to both sides.

(See following sheets forming part of this Notice.)

NORTH SIDE WORKINGS.

In the roadway parallel with the First Left Entry, which serves as the course for the air intended to supply the North Side workings, and where there should not be not less than 3,000 or 4,000 cubic feet traveling, I could find a volume of only 470 cubic feet of air.

Third Left Entry—now usually called the Second Left. The roof is dangerous between the curtain and the room on the left which is being driven to make connection with the road coming from the South Side. It needs immediate attention.

In the First Cross, or cut-off between the 3d and 4th right roads, where the entire current for this side of the bank should be traveling, the current has a velocity of less than 30 feet per minute—indicating a volume of less than 2,000 cubic feet, even when giving the bank all advantages in the calculations.

Between the First and Second Right a test was made in the air-course,—*i. e.*, the course intended for the air to travel—and no better result than the foregoing could be obtained.

At no point could any considerable volume be found, until the air-course leading to the fan from an old room which is connected by break-throughs with the First Right was reached. Here a volume of only 2,695 cubic feet was found. A considerable portion of this is due to leaks, which are of no service to the places where the diggers are.

At the Fan—In the air-way about 30 yards back from the fan-shaft, the current known as the "North Split" amounts to only 3,784 cubic feet. Here we have advantage of all the leakages that unite with this split, and yet the total, if traveling the North Side bank as it should (which it does not do) is but little more than would be required for the number of persons now there. Under favorable conditions, we should have found a large surplus of air here.

SOUTH SIDE.

Main Entry—The roof is dangerous a short way back of the lie-way, between the First and Second Right Entries.

Second Right Entry—It is intended for the ventilating current for the south side to turn into this entry, but while there should be at least between 3,400 and 4,000 cubic feet traveling, there is hardly any; not much, if any, more than 600 cubic feet.

No provision is made to cause the air to travel the fourth right road of this entry.

The roof is bad at the head of this entry, and there is much water there. The place should be drained. The same is true, with respect to water, of the Cross-cut leading towards the Fourth Right Entry.

Third Right Entry—The ventilating current should pass to the Fourth Right by a break-through from the third left road on this entry back of the Cross cut above mentioned. We should expect to find not less than 3,400 or 4,000 cubic feet of air passing through the break-through, but the volume really traveling is less than 300 cubic feet.

Fifth and Sixth Right Entries—Practically no current is coming to the work here.

Fourth Left Entry—This is practically without ventilation.

Third Left Entry—This is practically without ventilation. A test was made in the break-through into the room off the Second Left, where the total current should be traveling; but there was only a volume of less than 500 cubic feet.

Second Left Entry—The same result was obtained as above at the break-through, which is intended to serve for the course of the total current here.

First Left Entry—In the break-through from the First Left Cross-cut of this entry to the air-way leading to the fan, where the current has the advantage of leaks, I could find a volume of only 1,085 cubic feet. There should be not less than 3,400 or 4,000 cubic feet, on account of the workings to be traversed alone.

At the Fan—A short distance back from the fan shaft, where the entire South Split is traveling, I could find only 2,809 cubic feet of air. There should be, for the number of persons on the South Side, not less than 3,400 or 4,000 cubic feet, on account of the ventilating current, and since we here have the advantage of leaks, we should expect to find a large surplus.

Bottom of Shaft—The roof at the bottom of the shaft needs to be protected by additional timbering, which should consist of not less than six or seven additional sets, with good lagging above. The cross pieces should be thick and strong and solid, and supported by legs—not by notches cut in the coal. The importance of doing this work promptly and well is pressing. The roof at the edge of the shaft has already commenced to fall, in consequence of insufficient support in the first place, and what timbers are there are "swagging." The shaft on that side is very much out of plumb, as it has always been, and there is danger, unless the bottom is thoroughly well supported, and the further breaking down of the roof prevented, that the measures above will settle towards the shaft, and cause the latter to collapse. I shall not be surprised to see that side of the shaft eventually come in any way, unless it is straightened and retimbered, as the shales gradually soften under the action of percolating water. It may *possibly* stand for some time, but it will always be dangerous until straightened.

Propping—Unless more props are used in this mine, especially where the roof is "faulty"—unless they are set more thickly in the working places, and kept closer to the faces—there is going to be a serious accident.

Notice has heretofore been given on this point. The roof of "No. 9" coal, however strong and "fine" it may appear, is notoriously treacherous. With gas and water both working on it, as is the case here, no chances whatever should be taken with it. What is referred to at this mine as "faulty roof," or "the fault," is simply the thinning out of the black slate, with the development of the "bastard lime-rock" that frequently appears above "No. 9" wherever the coal is worked. In nearly every instance where that "bastard rock" appears, at the expense of the black slate, in the later workings of this mine, the roof has come down and become dangerous in the vicinity; and this is chiefly because the scantiness of the propping. If a prudent system of frequent propping, instead of the present meager one, was followed, there would be comparatively little trouble with the so-called "fault." Moreover, since the proposition is to first work the coal to the boundaries by excavating a system of intersecting roads 20 feet wide (and they are frequently wider), leaving blocks 30 by 60 feet to be drawn upon the return, the roof will become so bad in the older workings that the danger from it will be much greater than usual when the work of drawing said blocks is undertaken, unless a better system of propping is followed; and in addition, the probability is great that much of the coal now left in the blocks will be lost. I have heretofore expressed my doubt as to the ultimate success of working this coal on the present plan, and I am now satisfied that unless the roof of the working places is propped more liberally, it will prove not only dangerous, but end in the loss of coal when the removal of the blocks or pillars is under way. I trust that you will give this warning serious consideration, and that the present loose system of propping will at once be abandoned, and the working places propped more closely.

Cages and Shaft—There are no safety-catches to the cages. There are no safety-gates at the shaft. The guides for the cages need repairing, strengthening and straightening. The rubbing plates on the cages need fastening, so that they will receive the guides squarely. Unless the cage is made to hang evenly and travel evenly, there is too much oscillation, and too much strain on the rope.

In an attempt to fit the extension map sent for your mine up to June 1st, 1892, to the map sent for December 30, 1891, I find that they cannot be made to agree; one or the other is wrong. At no mine within my knowledge is an accurate map, made from actual, detailed, careful surveys, of more importance than at Baskett.

No. 330.

CENTRAL APPALACHIAN CO.

No. 330 (C. J. N). FRANKFORT, November 22, 1892.

To E. H. Patterson, Esq.,
Managing Director Central Appalachian Co., L'td,
Knoxville, Tenn.

DEAR SIR: You are hereby respectfully notified that on November 17, 1892, the date of inspection, an examination of your mine, the No. 1 Straight Creek, above Pineville, Ky., showed the following requirements to be necessary in order to put the bank in proper condition, and maintain it so:

1. The First Right Air-course is clogged with slate. It must be cleaned up.
2. Future work should be kept away from the "old works" that lie back of (to the right of) the workings on the First Right Entry.
3. Provision must be made to send the air through all working places on the First Right Entry and its air-course, so as to have the current travel within 60 feet or less of the faces. This will require the doors now on the rooms to be in good condition, and curtains so placed as to cause the air to travel through the rooms instead of on the entry.
4. The Second Right Air-course is clogged with slate in places. It must be cleaned up.
5. *Second Right Entry*—The water-ditch needs cleaning.
6. *The Main*—The side ditches need cleaning.
7. The drainage of the mine should be secured by use of a pump or siphon. The pump is the better means. It is pretty clear that unless proper provision is made for draining the bank, there will be considerable trouble from water.
8. The present furnace is inadequate, and it was not properly placed. I am satisfied that unless improvements are made in this direction, I shall find the ventilation of the mine insufficient when you work any considerable force in the bank. I strongly recommend that you use a fan for securing ventilation; always the best in such a mine as yours, it is in the end the cheapest and most easily managed means for securing ventilation.

9. The "map" you furnished of the mine is not correct. I respectfully suggest that an accurate one be made of all accessible parts of the bank, in order to secure an intelligent working of the mine. Without an accurate map to guide me, it was impossible for me to judge of the thickness of pillars between the different excavations. A map will be due at this office within 60 days after December 1st.

10. The air-course on the left of the Main entry needs cleaning up.

No. 331.

CENTRAL APPALACHIAN CO.

No. 331. FRANKFORT, November 22, 1892.

To E. H. Patterson, Esq.,
Managing Director, Central Appalachian Co., L'td,
Knoxville, Tenn.

DEAR SIR: You are hereby respectfully notified that on November 17, 1892, the date of inspection, an examination of your mine, the No. 2 Straight Creek, above Pineville, Ky., showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The mine is hardly more than fairly well opened, but it seems pretty clear that it will eventually be necessary to cross-timber the Main Entry for a distance of 100 to 150 feet, beginning at the mouth, on account of the nature of the roof. It would be best not to wait till the roof begins to break before doing this work.

The air-shaft now being completed, is very awkwardly placed for a furnace to be used. It would be wise to use a fan.

No. 332.

STURGIS MINE.

No. 332. FRANKFORT, FEBRUARY 15, 1892.

To J. E. Downing, Esq.,
Sec'y and General Manager Sturgis Coal & Coke Co.,
Sturgis, Ky.

DEAR SIR: You are hereby respectfully notified that on February 9, 1893, the date of inspection, an examination of your mine, the Sturgis Shaft, showed it to be in the condition noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

1. While sufficient air is entering the bank, and flowing into and up the East entries, for 110 to 120 men, it is nearly all lost, and returns before the West side is reached—where it is especially important for it to be. This matter was verbally discussed with you, and I bear in mind the fact that you have only had charge of the mines since December 1st, 1892, and your statement that you will at once have all this remedied. I also have your favor of the 11th inst., in which you say that you are busy putting in the necessary doors, of which there were none in the bank when you took charge. As stated in my letter of the 10th inst. to you, it is necessary to send the air so as to sweep the faces of the rooms on the East and West entries, to prevent any accumulation of fire-damp. I content myself at present with making that general statement. I found no standing gas in the mine, but it is clear that the ventilation must be thorough to prevent any such accumulations.

2. As stated in my letter of the 10th inst., a second outlet is required for the mine. I note your verbal statement in relation to that, and your statement in letter of the 11th inst., that it "will receive your attention, beginning with the time as soon as Mr. Mills arrives, so that you can consult with him as to the best points to place it" (the second outlet).

3. As stated to you verbally, the roof over the coal you are

working is deceptive and treacherous ; one not long acquainted with it would be inclined to place more dependence on it than its real nature warrants. In consideration of this fact, and the one that you are carrying the rooms 30 feet wide, I do not think that it is safe to work with no more props in the rooms than are now used.

4. The bottom on each side of the shaft should be cross-timbered.

No. 333.

HENDERSON MINE.

No. 333. FRANKFORT, February 15, 1893.

To Jno. O'Byrne, Esq.,
President Henderson Mining and Manufacturing Co.,
Henderson, Ky.

DEAR SIR: You are hereby respectfully notified that on February 11, 1893, the date of inspection, an examination of your mine, the Henderson, showed it to be in the condition, with respect to ventilation of rooms, etc., noted herein, in violation of the Mining Law, a copy of which was furnished you.

Statements herein are framed as if made on the day of inspection.

1. The Cross Entry—Plenty of air is coming to this entry, but it is allowed to travel the entry instead of being sent into the rooms, where it is required. Check-curtains (one or two) should be placed on the entry so as to send the air into and through the rooms, and the current should be kept within 60 feet or less of the working faces. At present, the air is very close and smoky in all the rooms, except No. 11. A number of the break-throughs between rooms are quite small; a person has to "squeeze through." Break-throughs should be at least four feet wide. Props should be kept closer to the faces of the rooms than appears to be the general rule.

2. The Air-course Entry—Plenty of air comes to this entry, but, as in the case of the Cross entry, it is not carried through the rooms. It must be made to travel through the rooms—which may be easily done—and keep within 60 feet or less of the faces. Props, as a rule, are not kept close enough to the working-faces.

The roof of the entry between rooms 6 and 7 needs attention. It is broken and dangerous. The roof between rooms 6 and 5 is breaking down, and the cross-timbers sagging and breaking. This should be remedied.

I suggest that if thicker pillars were left much of the trouble with the roof, arising from the "melting" away of the underclay from the bottom of the coal and the "slabbing" of the coal, would be obviated. The natural tendency of the coal to break away in vertical slabs renders it unable to support much pressure; the plan of leaving thicker pillars would diminish the amount of pressure on the roof in the excavated spaces, and thus materially reduce the tendency to creep, with its attendant evil results. The pillars could be drawn at the proper time.

No. 334.

BASKETT MINE.

No. 334 (C. J. N.) FRANKFORT, February 15, 1893.

To C. L. Nall, Esq.,
President Baskett Coal Co.,
Owensboro, Ky.

DEAR SIR: You are hereby respectfully notified that on February 13, 1893, the date of inspection, an examination of your mine, the Baskett, at Baskett, showed the shaft to be in the condition, noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

1. The Shaft—The shaft is in a dangerous condition. The guides for the cages are crooked, warped, and in bad condition generally. Viewed from the bottom of the shaft, they present an almost snake-like sinuosity. In the upper part of the shaft, near and at the tipple-landing, the frame-work, guides, etc., are in an especially insecure condition. The board wall or brattice in the west end of the shaft is dangerous in its present condition. At the time of inspection, the west cage on two occasi [illegible] ff the guides and caught in the shaft. On one of t [illegible] nen were in the west cage, as I understood, and

Mr. Jameson and myself were in the other one. The lives of all were in much peril.

The upper part of the shaft on the north and south sides is very much out of plumb. Viewed from below, each side, towards the top, is seen "leaning ovér" the lower part, as if ready to fall in, as they certainly will do at no remote day unless the matter is remedied. The shaft for a distance of at least 30 feet below the ground landing, needs to be straightened and retimbered.

The unsafe condition of this shaft has been brought to your attention before. I note the fact that in a conversation with me at Baskett on the day of inspection, you satisfied me that you personally had not been in fault—that you expressed your desire and intention to have the timbering of the shaft, the guides, etc., put in thoroughly good order.

2. *The Cages.*—Safety-catches are off both cages. There is no top or hood at all on the west cage (*i. e.*, the left-hand one as seen from the engine-room), and the one on the east cage is insufficient—it affords little protection to persons on the cage from objects falling down the shaft.

3. *Safety-Gates*—There are no safety-gates at the shaft. There should be such gates at the ground landing and also (automatic ones) at the tipple-landing. The floor of the tipple-landing being covered with iron, renders it especially dangerous for the men working about the mouth of the shaft unless safety-gates are put in.

4. *Escape Shaft*—The exit at the top of the escape shaft (used also as an air-shaft) has been nailed up so that it is not in the "available condition" required by the law. A door should be placed there, and the shaft kept in such condition that the requirements of the law (see section 10) shall be strictly complied with. While the law does not require that the men shall be permitted to use the shaft at any and all times, just when the notion may seize them, it does require that the shaft shall be kept in such condition that it *may be used* at all times, whenever the necessity may arise, or whenever it may be deemed expedient for it to be used. I, myself, would have come up the escape shaft when hoisting was suspended on account of the accident on the day of inspection, but was prevented from doing so in consequence of it being nailed up.

No. 335.

PEACOCK MINE.

No. 335 (C J. N.) FRANKFORT, May 10, 1893.

To C. D. Anderson, Esq.,
Superintendent Peacock Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on April 21, 1893, the date of inspection, an examination of your mine, the Peacock, showed it to be in defective condition, as regards ventilation, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

(In accordance with established rule, a copy of this Notice will be sent for the information of the miners employed at your mine.)

The Frisby Entry—5 persons.

As at present arranged, natural means are depended on for ventilating this entry; it being expected that a split from the current which enters the mouth of the Main will reach here and flow out of a shaft—in which there is no fire or other means for procuring a draft—that is situated on this entry. As might be expected, the supply of air is very irregular. At times there is a fair current, and again the air is at a dead standstill. Moreover, the air baffles—sometimes ascending the shaft just mentioned, and at others descending it. I could not have a current long enough in either direction to be able to measure it. This should be remedied, so as to give the work here an ample and constant current. A curtain should be hung on this entry, just in from the Glancy, so as to cause the air to travel better through the left hand rooms on this entry. It may be remarked that the shaft on this entry, under present conditions, works to the disadvantage of the furnace. A little consideration will show why that is so. Unless the air is traveling *down* it, towards the furnace, it interferes with the ventilation of the rooms that are on the left of the Gough Straight, back of where the latter turns to the right.

The Gough Entry.

I designate the entry from the Glancy up to where the turn to the right is made as the "Straight Gough," and the part after the turn is made as the "Right-hand Gough."

Straight Gough—50 persons. The rooms on the left are not sufficiently ventilated. The air is not sent through them. (See section 10, new Mining Law.) It is true that they are connected with the right-hand rooms of the Glancy Entry, the idea doubtless being to have the air from the shaft on the Frisby Entry to course through them. But that shaft really works against such a plan. When the air ascends the shaft, it, of course, doesn't serve these rooms; and the remainder of the current which enters the mouth of the bank, travels the Gough *past* the mouths of these rooms, since there is no provision for turning it into the rooms. These rooms, in fact, are so situated that, under present conditions, they are in what may be called an eddy—as could readily be shown if I had a map of this portion of the bank, which I have not got because your company is delinquent with respect to the map that was due last December.

Right-hand Gough—15 persons. The ventilation is utterly inadequate here. The atmosphere is close and smoky. The head of the entry is too far ahead of the course for the air. The rooms on the right would be well enough aired if there was a sufficient current, but there is not. No provision having been made to turn the air into and through the rooms on the left, they not only are not now, but they would not be, sufficiently ventilated even were there a sufficient current. There ought to be not less than 6,300 cubic feet of air passing here (the Frisby Entry being omitted), since this is the proper course, as arrangements now are, for the total supply for the bank to follow; but there is less than 1,000 cubic feet—not enough for this entry alone.

A measurement made in a break-through, which leads to a room off the Old Warnack Entry, and where not only all the air from this entry must pass, but where the current is increased by leakages that do not reach this entry, I found only 1,667 cubic feet of air.

Provision must be made for giving this entry thorough ventilation. There is plenty of air entering the bank with which to do so. The conditions there now are very bad.

Other Entries—The New Baker, New Warnack and Old Warnack Entries, in which pillars are being drawn, and the Colvin, in which stumps are being pulled (a total of 13 persons), require no special attention at present on the score of ventilation. They are better ventilated than the Gough, and when the latter is properly supplied with air they will necessarily, at the same time, be benefited thereby.

The Furnace—I measured a volume of 16,371 cubic feet of air passing through the furnace.

Note—I find that an impression seems to have gained ground in some quarters in Laurel county that there is little necessity for giving attention to the Inspection Notices served by the Inspector. If such an impression really exists, it is due to the fact that the Inspector has not been able to visit the mines as frequently as the conditions required; but it will be unwise to proceed on the idea that the Notices may safely be ignored. I trust that you will not delay in correcting the evils now existing at your mine, as noted herein.

No. 336.

WELSH MINE.

No. 336 (C. J. N.) FRANKFORT, May 10, 1893.

To Wm. Welsh, Esq.,
Lessee Pittsburgh Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on April 22, 1893, the date of inspection, an examination of your mine, the "Pittsburgh"—*i. e.*, your mine, near Pittsburgh—showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

You have driven too far without providing ventilation for the work. This must be given so as to keep the air within 60 feet or less of the working-places; and artificial means, such as are indicated in section 10 of the New Mining Law, must be provided for securing ventilation. "Natural means" for ventilation will not be legal, and must not be depended upon. Mr. Delph, your Mine Foreman, informed me that rooms would be turned every 24 feet and widened to 18 feet, thus leaving a pillar of only 6 feet. As your coal is a shooting coal, I am of the opinion that such thickness of pillar will prove inadequate, even where the covering is not thick. Such pillars are easily shattered.

No. 337.

LAUREL MINE.

No. 337 (C. J. N.) FRANKFORT, May 10, 1893.

To J. W. Bastin, Esq.,
Superintendent Laurel Coal Company,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on April 22, 1893, the date of inspection, an examination of your mine, the Laurel, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

1. With 77 persons in bank, the volume of air supplied is insufficient. The highest measurement of the current flowing through the bank, showed only 5,133 cubic feet of air. (See section 10, new Mining Law).

2. The drainage is very defective on the Second Left Entry.

Second Left Entry—15 persons.

A volume of 5,133 cubic feet of air is entering this entry. As this is the course for the total volume for the mine to follow, there should be, with the present number of persons in bank, not less than 7,700 cubic feet coming. In fact, since there are unavoidably great losses by leakage in a mine ventilated on the plan followed here, there ought to be at the start a much larger volume than that.

In the break-through from the air-course on the left, beyond the Patterson Entry, I could find only 2,896 cubic feet of air. Here, also, there should be not less than 7,700 cubic feet. The head of the entry is 65 feet beyond the air. The air should be brought up before the entry is driven farther.

Patterson Entry—21 persons.

There is a volume of only 1,402 cubic feet passing through the last break-through to the air-course leading through the rooms on the left. The face of the entry is 70 feet beyond said break-through, and the entry should not be driven farther until the air is brought up. Of course there are leaks through the curtains at the rooms near the Second Left Entry, but a measurement on the latter shows only 2,896 cubic feet of air coming from the first room of the Patterson, whereas there should be, with the present plan of ventilating by a single current, not less than 7,700 cubic feet.

Third Left Entry—13 persons.

There is a volume of only 4,362 to 4,704 cubic feet of air coming to this entry, whereas there should be not less than 7,700 cubic feet. There are two open break-throughs to the return air-course of this entry; the rear one should be closed.

Fourth Left Entry—16 persons.

In the return air-course there are only 2,803 cubic feet of air passing; there seems to be considerable leakage to the Main, which is caught at the next entry. There should be not less than 7,700 cubic feet. A volume of 6,500 cubic feet is needed simply to meet the requirements of this and preceding entries. It is clear that the ventilation here is not sufficient, either as to quantity or freshness of the air.

Fifth Left Entry—8 persons.

I could find only 3,574 cubic feet of air leaving this entry, whereas there should be not less than 7,700 feet. This is the volume (3,574 feet) that goes to the Sixth Left Entry, and enters the Main return air-course from this part of the mine.

Note 1—While, no doubt, the diminution of the volumes at various points is largely due to leakages, yet we find that there has been a loss at the Fifth Left Entry of only 1,559 cubic feet from the current as measured in the Second Left Entry, and at no principal passing point was the loss much more than 2,000 feet; showing that the inadequacy of the ventilation is not due so much to defective provisions for conducting the air as to the inadequacy of your present means for procuring a steady, sufficient ventilating current throughout the bank. No doubt better ventilation could now be obtained by using two currents; but I believe your bank has grown so much beyond the capacity of your present furnace that you will not secure thoroughly satisfactory ventilation until you provide greater power at the air-shaft.

No. 338.

Pitman Mine—East.

No. 338 (C. J. N.) FRANKFORT, May 10, 1893.

To William McNeil, Esq.,
Superintendent Pitman Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on April 24, 1893, the date of inspection, an examination of your mine, the Pitman "East Bank" mine, showed it to be in the defective condition noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Plenty of air enters the bank and passes to all the entries working, but it is not properly distributed to the working places.

Work is carried too far beyond the air. See Section 10, new Mining Law, concerning this. Break-throughs for the air must not be more than 60 feet apart, either on entries or in rooms. You are making the distance 73 to 81 feet.

(In accordance with established rule, a copy of this Notice will be sent the Bank Committee of your mine.)

First Left Entry—12 persons.

The head of the entry is about 169 feet beyond the air, and in that stretch are two rooms going on the right, and an air-course, 114 feet long, going towards the Second Left Entry. It was understood that said air-course would be completed by Wednesday night, April 26th, in which event the air would be brought up satisfactorily (if care is taken to carry the air through the rooms so as to keep it within 60 feet of the faces);

but such a condition of non-ventilation should not have been permitted to exist.

There is much water on the entry at and in the vicinity of the fourth right-hand room.

In the air-course leading to the Second Left Entry I measured 9,363 cubic feet of air. This was shortly after the furnace fire had been shaken up and replenished.

Second Left Entry—19 persons.

Three rooms on this entry are beyond the course of the air, as is also an air-course that is being driven towards the First Left Entry—said air-course being about 8 feet back from the head of this entry. When connection is made with the First Left, by means of said air-course, the head of this entry may be sufficiently aired. Care must be observed to also send the air through the rooms so as to keep within 60 feet or less of their faces, and not let it simply travel the entry or air-course.

Third Left Entry—5 persons.

Sufficient air comes to this entry, notwithstanding that most of the current goes to the Main Entry from the Second Left. Coming to this entry is a volume of 2,366 cubic feet of air.

Second Right Entry—9 persons.

There are 5 rooms on the right. They are poorly ventilated, since the air is not turned into them.

Note—I trust that you will remedy the evils now existing at this mine, as noted herein, without delay.

No. 339.

PITMAN MINE—WEST.

No. 339 (C. J. N.) FRANKFORT, May 10, 1893.

To William McNeil, Esq.,
Superintendent Pitman Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on April 24, 1893, the date of inspection, an examination of your mine, the Pitman "West Bank" mine, showed it to be in the defective condition noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Plenty of air enters the bank, but it is not properly distributed.

You are driving entries too far ahead of the air.

You are systematically making break-throughs between entry and air-course 73 feet apart, whereas the law limits the distance to 60 feet.

The drainage is defective—especially on the First Left Entry.

First Left Entry—42 persons.

The volume of air entering this entry varies between 8,804 and 9,411 cubic feet.

The head of the entry is 210 feet beyond the air—150 feet too far. The head of the air-course is 80 feet beyond the air—20 feet too far.

The air is not turned into and through the rooms on the left of the entry, but instead is allowed to simply travel the entry. It should be kept within 60 feet or less of the faces of the rooms, as well as within that distance of the heads of the entry and air-course. See Section 10, New Mining Law.

The eleven rooms on the right, between the first and second air-courses that go through to the Second Left Entry, are not properly ventilated. They should be given more air. Only about 3 of the rooms are up 60 feet beyond the air-course for this entry, but since the air now travels the *entry* to the break-through that is 80 feet back from the head of said air-course, all these rooms, being back of the brattice on the air course that turns the air towards the Second Left Entry, are cut off from the current, and receive only so much fresh air as comes by diffusion. Some of the rooms on the right, notably the 1st, 3d and 7th back from the brattice that is across the air-course, need to be better propped towards the face.

Second Left Entry—30 persons.

There is no current for the block of rooms on the left lying between the first and second air-courses that come from the First Left Entry.

There are two open break-throughs from the air-course that feeds this entry; the rear one should be closed. At the time of inspection, the head of the entry was 179 feet beyond the last complete break-through, but there is one incomplete break-through still beyond which, when the air-course between it and the one back of it is completed, would bring the air within 106 feet of the head of the entry—leaving the head still 46 feet too far ahead of the air.

The face of Nat Gilbert's room, the 5th room (on the right) counting from the head of the entry, is 70 feet beyond the air.

Goodwin's room needs to be better propped.

The current passing through the break-throughs of the rooms on the right is not so strong as it should be.

At the Furnace—I measured 13,190 cubic feet of air passing through the furnace. There was a pretty fair fire burning when the measurement was made; but there was considerable ash on the grate, and I believe a much larger volume of air could be obtained with a stronger fire.

Drainage—It is evident that this mine can not be kept adequately drained without the use of a good pump.

No. 340.

VICTORIA MINE.

No. 340 (C. J. N.) FRANKFORT, May 10, 1893.

To the Victoria Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on April 25, 1893, the date of inspection, an examination of your mine, the Victoria, showed it to be in the condition noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Although an ample volume of air (8,444 cubic feet) enters the Main Entry, to ventilate the Sixth Left, head of the Main, and the Seventh Right entries, it is not well enough conducted in some parts.

In some parts of the bank the work is carried too far ahead of the air.

The roofs of the entries need attention.

Sixth Left Entry—20 persons.

The air is not in sufficient volume at the head of this entry; the current is very slow. There should be at least 2,700 cubic feet, since here is the point for the entire current for the Sixth Left and Seventh Right entries to pass, but hardly more than enough to deflect the lamp-flame is traveling. The roof of this entry needs to be gone over and protected. The matter was brought to the attention of Mr. Hughes as we traversed the entry.

The Main Entry.

There is practically no ventilation on the Main beyond the Sixth Left Entry.

Seventh Right Entry—7 persons.

There are three rooms towards the head of the entry which are beyond the course of the air, and they have, therefore, practically no ventilation. The air should be kept within 60 feet or less of the faces of all the working-places. See Section 10, New Mining Law.

In the air-course leading to the Sixth Right we should be getting practically all the current that enters the Main Entry (8,444 cubic feet), since this is the way intended for it to travel to the furnace; we ought to be getting at least 2,700 cubic feet on account of the number of persons to be supplied in this end of the Sixth Left Entry; but although there is a pretty brisk current at times, at others there is almost none, or not more than enough to deflect the lamp-flame—certainly not more than 500 cubic feet per minute. The air should not be allowed to baffle in this way, but provision should be made to secure a *constant*, ample current for this and the preceding entry.

The roof of this entry needs to be gone over and protected. The attention of Mr. Hughes was called to the matter as we traversed the entry.

Sixth Right Entry—4 persons.

The head of this entry is 74 feet beyond the air, and is, therefore, too far. Care should be taken to keep the air within 60 feet or less of the working-faces. I measured a volume of 1,421 cubic feet of air coming to this entry from the Fifth Right.

The roof of this entry needs to be gone over and protected.

The attention of Mr. Hughes was called to the matter as we traversed the entry.

Fourth Right Entry—12 persons.

Care should be observed to have the current travel through *all* the working rooms that are up 60 feet or more, so as to keep the air within the requisite distance of all the working-faces.

The roof of the entry needs to be gone over and protected. The attention of Mr. Hughes was called to the matter as we traversed the entry.

No. 341.

UNION MINE.

No. 341 (C. J. N.) FRANKFORT, May 10, 1893.

To Thompson Jeffrey, Esq.,
General Manager Union Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on April 25, 1893, the date of inspection, an examination of your mine, the Union, showed it to be in the defective condition noted herein in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The mine is without ventilation—is in very defective condition in that respect. "Natural means" are depended on to secure ventilation, contrary to State law. At no point could a volume of air large enough to be measured by ordinary means be found; and yet there are 19 or 20 persons in bank, requiring 2,000 cubic feet of air.

Fourth Right Entry—9 or 10 persons. The principal part of the work is on this entry. There is no ventilation, and the atmosphere is very close, smoky and unhealthful. Even were there a sufficient volume of air coming to the entry, it would not ventilate the workings properly, because it would go out of the first rooms on the right of the entry, and pass immediately out to the Main, there being no door to keep it from doing so.

Other Entries—There is a little air traveling to and from the shaft on the Seventh Left Entry, but not enough to measure.

I recognize that the work of pulling stumps on the Fifth Left Entry will soon be done, and that entry, therefore, is left out of the question. I note the fact that you have been endeavoring to provide an adequate air-shaft to secure ventilation, but have been unfortunate with your surveys; also that water having broken into the Seventh Left Entry near the head, the shaft there has been rendered useless, for a time, for a furnace; but a fire basket could doubtless be used until you reach the other shaft.

No. 342.

STAR MINE.

No. 342 (C. J. N.) FRANKFORT, May 10, 1893.

To Jonathan McNeill, Esq.,
For Star Coal Co.,
East Bernstadt, Ky.

DEAR SIR: You are hereby respectfully notified that on April 26, 1893, the date of inspection, an examination of your mine, the Star, showed it to be in the defective condition noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

1. You are depending on natural means for ventilation, contrary to law. See Sections 10 and 3, new Mining Law.

2. The mine is without ventilation, there being practically no current even on the "North Entry," where there is the best chance for ventilation to be had under present circumstances. On the "Broughton Entry," where 10 or 12 persons are at work, there is no ventilation, and the atmosphere is very close and smoky, and unhealthful. The door on that entry appears to be kept open most of the time. Whether this is due altogether to carelessness on the part of the drivers, or to an attempt to give the entry a chance to get an occasional whiff of fresh air (which, however, would be of little service to the men working on the entry, they being beyond the reach of its direct effects) at the expense of the "North Entry," is a question.

3. I regret that so little regard is paid to the requirements of the law at your mine, not only on account of the indifference it shows for the welfare of the men working for you, but because it is likely to result in a costly surprise to you. There may be an impression that there is little need to use any diligence in complying with the Notices of the Inspector. If so, it is due to the fact that the Inspector has not been able to visit the mines as frequently as the condition requires; but it will be unwise to proceed on the idea that the Notices may safely be ignored. I trust that you will not delay in correcting the evils now existing at your mine, as noted herein, and that, knowing the law in regard to ventilation, you will hereafter see that it is strictly complied with at your place.

No. 343.

NICKEL PLATE MINE.

No. 343 (C. J. N.) FRANKFORT, May 10, 1893.

To J. M. Thompson, Esq.,
General Manager Pearl, Thompson & Co.,
East Bernstadt, Ky.

DEAR SIR: You are hereby respectfully notified that on April 26, 1893, the date of inspection, an examination of your mine, the Nickel Plate, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The Fifth Right, with 22 persons, has no ventilation; chiefly because there is practically no draft at the upcast shaft, and the doors on the First Right—one just beyond the Clark and one beyond the Burton—are kept open. This entry can readily be aired sufficiently, if any care is taken to have it so.

No. 344.

PINE HILL MINE.

No. 344 (C. J. N.) FRANKFORT, May 10, 1893.

To John Morrison, Esq.:
Superintendent Pine Hill Coal & Iron Co.,
Pine Hill, Ky.

DEAR SIR: You are hereby respectfully notified that on May 1, 1893, the date of inspection, an examination of your mine, the Pine Hill, showed it to be in satisfactory condition.

Statements herein are framed as if made on the day of inspection.

I think, however, that the furnace should be lengthened, and the space on each side (except, perhaps, for a couple of feet) closed, so that the eddy which now seems to form in its vicinity, and retard the outward flow of the smoke, may be obviated. The furnace, considering its size, form and the width of the air-course beyond it, is set rather far back from the air-shaft.

No. 345.

LITTON MINE.

No. 345 (C. J. N.) FRANKFORT, May 10, 1893.

To. W. J. Litton, Esq.,
Secretary and Treasurer Litton Coal Co.,
East Bernstadt, Ky.

DEAR SIR: You are hereby respectfully notified that on April 28, 1893, the date of inspection, an examination of your mine, the Litton, showed it to be in the defective condition noted below in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The Powell Entry, beyond the Williams, is practically without ventilation, there being no current traveling there. Eight persons are working there.

Back of the door, between the Williams and King Entries—

being part of the original Entry C—there are twenty persons working, and there is practically no ventilation.

The lack of ventilation here is primarily due to the fact that you are depending on "natural means" to obtain it, no fire being kept in the shaft; there is no current of consequence. This must be remedied, *and the current so conducted as to keep the air within 60 feet or less of the working faces.*

I confess that I am disappointed with the condition of your mine; I thought I had reason to expect it to be in fair condition. I trust that you will not delay in putting it in proper state.

No. 346.

DIAMOND COAL CO.

No. 346 (C. J. N.) FRANKFORT, May 10, 1893.

To H. C. Thompson, Esq.,
General Manager Diamond Coal Co.,
Altamont, Ky.

DEAR SIR: You are hereby respectfully notified that on April 27, 1893, the date of inspection, an examination of your mine, the Diamond, showed it to be in the defective condition stated on page 2 of this Notice, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

"PAGE 2."

The works are without ventilation, although there are about 50 persons in bank, most of them in rooms. The lack of ventilation is so marked that the atmosphere of the rooms on the *First Left Entry* and on the *First Right Entry* is smoky and close; this is particularly true of the First Right Entry. This bank should never have been opened so far as it has gone without, at the same time, providing for ventilation, both in the interest of the welfare of the men employed and in compliance with the known requirements of the State law.

No. 347.

LILY MINE.

No. 347 (C. J. N.) FRANKFORT, May 10, 1893.

To Col. Geo. W. Colbert.
Superintendent Lily Mining and Manufacturing Co.
Lily, Ky.

DEAR SIR: You are hereby respectfully notified that on May 1st, 1893, the date of inspection, an examination was made of your mine, the Lily No. 1 Bank (Entry No. 5), concerning which, see page 2 of this notice.

Statements herein are framed as if made on the day of inspection.

"Page 2."

In consideration of the fact that you are just getting ready to start up again after a stop of two months—many repairs, inside and out, and arrangements for draining the bank, having been necessary before you could do so—I have only to say that when work is resumed an amount of ventilation equal to 100 cubic feet of air per minute per person employed must be given, and that the air must be so conducted as to keep within 60 feet or less of the working-faces; also that the roof of the No. 5 Main still needs protection in many places, as does that of the Kensey. I note the fact that you have already recognized the necessity for giving adequate ventilation and protecting the roofs of the entries, and that you have made great improvements in both respects, and that you have also made elaborate preparation for keeping the mine drained. I must confess my surprise at the very defective condition of the mine, as left by your predecessor, apparently. I thought I had reason to expect to find the mine in good condition.

I measured a volume of 15,818 cubic feet of air entering the bank. This is one of the results of your moving the fan to this place. I could not obtain a measurement showing even half that amount when the last inspection was made, at which time the old furnace was in use.

No. 348.

FALCON MINE.

No. 348 (W. U. G.) FRANKFORT, July 17, 1893.

To Mr. John S. Adair,
Superintendent of Falcon Mine,
Falcon, Ky.

DEAR SIR: You are hereby respectfully notified that on July 12, 1893, the date of inspection, an examination of your mine, the Falcon, showed it to be in defective condition as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Although a volume of 1,795 cubic feet of air is entering the mine, it is not carried to the working places; hence, these portions of the mine where the men are at work are without ventilation.

There are four men at work in the rooms to the left of the Main Entry. In the air-course to the Second Right Entry, there are several men at work. All are ahead of the air. In both of the above cases the air must be brought up to within 60 feet, or less, of the men.

The drainage is very defective; there are no ditches by which to keep the roadway clear of water, which is nearly boot-top deep in places. This must be attended to, and the mine given thorough drainage.

No. 349.

HENDERSON MINE.

No. 349 (W. U. G.) FRANKFORT, July 17, 1893.

To Mr. John O'Byrne,
Manager of Henderson Mining and Manufacturing Co.,
Henderson, Ky.

DEAR SIR: You are hereby respectfully notified that on July 13th, 1893, the date of inspection, an examination of your mine, the Henderson, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The ventilation and drainage are satisfactory. But I find that the safety-catches on the hoisting cage and the brake on the hoisting drum are quite weak; they should be strengthened.

No. 350.

ISLAND SHAFT.

No. 350 (W. U. G.) FRANKFORT, July 17, 1893.

To Messrs. McKenney & Stanley,
Island, Ky.

DEAR SIR: You are hereby respectfully notified that on July 14th, the date of inspection, an examination of your mine, the Shaft at Island, showed it to be in defective condition, in the matter of ventilation, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The mine is entirely without ventilation. This must be remedied and an ample amount of air, properly distributed according to section 10 of the revised Mining Law, furnished at once.

No. 351.

MEMPHIS MINE.

No. 351 (W. U. G.) FRANKFORT, July 30, 1893.

To Capt. J. W. Moores,
Superintendent Memphis C. & M. Co.,
Bevier, Ky.

DEAR SIR: You are hereby respectfully notified that on July 26, 1893, the date of inspection, an examination of your mine, the Memphis, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The ventilation is satisfactory, the drainage fairly good. But the roof of Third West Entry is very unsafe. I note the statement by Mr. Hendrie that this Entry is used but little. It should be wholly abandoned or securely timbered.

No. 352.

PIERCE MINE.

No. 352 (W. U. G.) FRANKFORT, July 30th, 1893.

To Mr. J. T. Pierce,
President Black Diamond Coal Co.,
Drakesboro, Ky.

DEAR SIR: You are hereby respectfully notified that on July 25th, 1893, the date of inspection, an examination of your mine, the Black Diamond (Pierce), showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

Ventilation and drainage good. During the inspection several shots (6 or 7) were fired. The practice of "shooting at all hours" is a bad one. Shots should be set in the evening the last thing done before leaving the rooms.

No. 353 & 354.

PROCTER MINES.

No. 353 & 354 (C. J. N.) FRANKFORT, August 11, 1893.

To W. T. Lewis, Esq.,
General Manager Procter Coal Co.,
Red Ash, Ky.

DEAR SIR: You are hereby respectfully notified that on July 28, 1893, the date of inspection, an examination of your mines, the "No. 1 South Entry" bank and the bank entered by "Short Six," showed them to be in very defective condition, as indicated herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The interior condition of these mines has deteriorated to such an extent that instead of being, as formerly, among the very best mines in the State, as regards condition, they are now among the most defective.

The ventilation, the large plan upon which the mine-work is carried on being considered, is little more than a mere makeshift—but little short of total failure. Air-ways have been allowed to fill with "falls," even those immediately at the beginning of the intake of the air—and apparently little concern is had for them. Hardly any current is moving through the works where needed, and yet shot-firing is allowed at any time (despite past assurances that the practice would be discontinued), and all day the entries and other working-places are filled with the gases of exploded powder and the smoke of lamps, which are positively destructive to the health of the men underground; work is carried far beyond the course of what little air there is, both in entries and rooms; and as a consequence the men are sickened—sometimes having to leave their working-places on account of the quantity of black-damp (carbonic acid) present, and the lack of air.

The drainage—but there has almost ceased to be any drainage. Men must tramp to and from their work in mud and water over their shoe tops in many places; they can only avoid it by catching a "trip" in and out, whenever they can, and were the safe rule of permitting no one to ride on a loaded car followed, they would necessarily always have to wade through water or tramp through mud in some of the entries when leaving work. While it is true that there are and have been much water and many "swags" to be contended with—and that efforts have been made in the direction of drainage in the past—no mining man will seriously contend that such a condition of muddy and water-covered entries as now exist here was unavoidable, or that it can be justified on the score of saving expense. It is hardly an open question whether it pays to let water accumulate to such an extent that blocks of coal, upon which the dead-work of development has been done, have to be set aside and other ground opened, thus increasing, frequently, not only the dead-work account, but the length of haulage; nor whether it pays to have the entries in good condition for the mules, etc., (even though the health and comfort of the men be left out of consideration).

I confess that I am surprised at and disappointed by the condition in which I have found these mines, and regret that the limitations resulting from having too much territory to look after have heretofore prevented my visiting them oftener.

Work on the No. 1 South Entry.

With 58 persons in this bank, not less than 5,800 cubic feet of air should be traveling the working places (since there is only one current), but the highest measurement on any of the working entries showed a volume of only 1,628 feet. What air does enter the proper intake is not distributed so as to ventilate the places where it is required, and in consequence of shot-firing being done at any time, the atmosphere of the working places is poisoned by the powder fumes, and rendered extremely unhealthful. See Sections 3 and 10 of revised Mining Law.

The second opening (Gangway No. 1), which is used as an intake for the air, which must serve as an escapement in case of closure of the other opening or the way to it, is partially filled with falls, and is in a dangerous condition—too dangerous for men to have to travel it. It should be rendered secure or a safer "second outlet" be provided. See Section 3 of Mining Law.

The falls that have occurred in "Gangway No. 1," and in the old room which connects it with "Gangway No. 2," this being the way for the intake of air, have so greatly obstructed the inflow of air that very little current enters the works. And yet, in consequence of shot-firing being done at any time, there [illegible]ould be a [illegible] volume entering than is ordinarily required.

Head of the Main Entry—2 persons.

The work here is 75 feet beyond the course for the air—15 feet too far—and the entry is still being driven ahead.

The Grubbs Entry, (formerly called the "Jenkins,")—13 persons.

Under the ventilating system followed at this bank, the entire volume of air for all the work, 5,800 cubic feet, should be traversing this entry and its rooms. But, at the best, a volume of only 1,256 feet could be found, and that was intermittent. The atmosphere is smoky and unhealthful. The head of the entry is 93 feet beyond the course of the air—33 feet too far.

The drainage must be improved; it is very bad, especially in the vicinity of the mouth of the entry; the water in places is over the top of the tram-rail, and there is no ditch on either side.

The Evans Entry—18 persons.

This entry is expected to get its air from the preceding one (the Grubbs). There is hardly any current coming. The work here, to be brief, practically has no ventilation. The entry was full of smoke, hanging there from the shot-firing as well as from the lamps, at the time I was in it, and the atmosphere is very unhealthful. The head of the entry is 53 feet ahead of the last room, and as there is no break-through between this room and the one back of it, the head is entirely too far beyond the course of the air. See sections 3 and 10 of Mining Law.

The Lackey Entry (formerly known as the Vaughn)—13 persons.

Under the most favorable conditions, I could find only 1,391 to 1,628 cubic feet of air here, when, since the one current is intended to supply all the entries, there should be not less than 5,800 feet. What does travel here enters the mouth of the third room on the left from the head of the entry, thus leaving the work towards the head entirely too far beyond the course for the air. Falls have occurred which tend to clog the way for the air from this entry to the Kinsey.

The Kinsey Entry—12 persons.

There is no ventilation here. It is so very bad that the atmosphere in some of the rooms was so charged with black-damp at the time of inspection that lights would hardly burn—men could not safely work in them. The break-throughs between some of the rooms are nearly closed with slack—as in case of

that between the rooms of Dick Smith and Arthur Peck; and the air-course following the Kinsey, and connecting with that which follows the Main, has falls in it, which choke the way for the air.

Note—My impression is, that the larger per cent. of the air that goes to the furnace comes from the old workings on the left of the No. 1 South Entry, and is of no service whatever to the present workings. The door at the mouth of No. 1 South Entry is open so much when the the bank is running that, for a good portion of the time, the furnace draws its air direct from the mouth of No. 1 South Entry, instead of through the Main and the entries (Grubbs, etc.), off of it. A check-curtain should be hung on No. 1 South Entry, a short distance outside of the entrance to the furnace, to remedy that trouble. Mr. Jenkins informed me that he would hang one at once. (See P. S.)

THE WORK IN BANK ENTERED BY "SHORT SIX" AND NO. 1 MAIN (OR "SHOP) ENTRIES.

The bank is intended to be aired by one current, and with 67 persons inside there should be not less than 6,700 cubic feet of air traversing the working places; but, instead of this, there is hardly any ventilation where required in any part of the bank, and yet shot firing is done at any time, thus aggravating the unhealthful condition of the atmosphere of the mine.

The drainage is very defective on "Short Six," on its prolongation called the Jones Entry, on the Second Main in the vicinity of the Old 8th, and on the Cross between the Old Six and Short Six. (The Smitty, upper part of No. 15, and Old Logan No. 2—formerly known as the New Logan—entries are drowned out.)

Work in many places is carried more than 60 feet beyond the air. The practice of carrying the work so far beyond the air is in direct violation of Section 10 of the Mining Law, and must be abandoned. The air must be carried so as to travel the rooms on both sides of an entry, when there are rooms on both sides, and it must be kept within 60 feet or less of the faces, now and hereafter.

Short Six Entry.

There is no drainage for this entry from near the mouth to near the large sump; there are no ditches, or if there are any they are filled with mud and need cleaning. The entry is entirely too wet and muddy for men to have to tramp through in going to and from their work, and they cannot be expected to rely upon "catching" a ride on in-bound or out-bound trips.

The Jones Entry—23 persons.

This entry is very wet and muddy—has practically no drainage. The entry is without adequate ventilation, as regards either amount or distribution of air. There is less than 700 cubic feet of air traveling (whereas for the persons on this entry alone there should be not less than 2,300 feet), and that was found between the first and second rooms working on the right, where advantage was had of leakages; and yet shot-firing is done at any time. The entry, in the upper portion, is constantly full of smoke—the fumes of burnt powder and from the lamps. There are six rooms working on the left that are entirely without ventilation, there being no provision to compel the air to travel through them. An ample amount of air must be provided for this entry, and the current must be sent through the rooms both on the left and the right, and it must be kept within 60 feet or less of the faces. There are two rooms (one just necked) on the right beyond the course for the air, and the head of entry is 70 feet beyond the last room neck. This must be remedied.

The New Logan—24 persons.

The work on this entry has practically no ventilation. The largest volume of air found measured only 510 cubic feet, whereas, since there is only one current for all the work, there should be not less than 4,700 feet for the work on this and the Jones entry alone. Work is carried entirely too far beyond the course for the air. There is no provision for directing the current so that it will travel the right-hand rooms. There should be a check curtain hung on the entry so as to send the air across to and into the last working room on the right, so that it will then travel the rooms back of it in orderly succession; and as additional rooms are opened on the entry, provision must be made to cause the air to travel them—on both left and right—and to keep within 60 feet or less of the faces.

Main Entry, No. 2.

The head of the entry is 121 feet beyond the course of the air—61 feet too far. The air must be brought up to the legal distance (within 60 feet or less of the face), and the head of the entry must, in future, be carried no more than that distance beyond the air. This entry must be drained in the vicinity of the Old 8th Entry.

The Cross Entry between the Short Six and the Old Six must be drained. It is very wet—the water being considerably over the rails in places.

The No. 1 Main Entry District.

Mallicott's Entry—12 persons. The air is not sent through the rooms. This must be done now and in the future work on the entry (as required by the law), and the current kept within 60 feet or less of the faces.

P. S. The roof of the Cross leading from the Main to the No. 1 South Entry is in too dangerous a condition for men to have to be traveling in and out of that bank. It must be rendered more secure.

No. 355.

Mountain Ash—No. 4.

No. 355 (C. J. N.) Frankfort, August 12, 1893.

To T. J. Davis, Esq.,
Superintendent Jellico Coal Mining Co.,
Mountain Ash, Ky.

Dear Sir: You are hereby respectfully notified that on July 29, 1893, the date of inspection, an examination of your mine, the No. 4 Drift of your Mountain Ash Mines, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Plenty of air is entering the bank, namely: 8,950 cubic feet for the 17 persons under ground; but it is not kept up to within the required distance (60 feet or less) of the working faces.

The First Left Entry—The head of the entry is 86 feet ahead of the air; 26 feet too far.

The Main Straight Entry—The head of the entry is 85 feet beyond the air; 25 feet too far. There is one room on that stretch on the right. The air is not carried through the rooms on this entry on the left, between the furnace and the First Left Entry. This should be remedied.

The air must be carried through the rooms on both sides of an entry when there are any on both sides, and it must be kept within 60 feet or less of the faces of all work.

No. 356.

MOUNTAIN ASH—NO. 1 & 3.

No. 356 (C. J. N.) FRANKFORT, August 12, 1893.

To T. J. Davis, Esq.,
Superintendent Jellico Coal Mining Co.,
Mountain Ash, Ky.

DEAR SIR: You are hereby respectfully notified that on July 29, 1893, the date of inspection, an examination of your mine, the No. 1 and 3 Drifts, forming one bank, of your Mountain Ash Mines, showed it to be in the defective condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Plenty of air is entering the bank for the 37 persons under ground, but it is not kept up to within the required distance (60 feet or less) of the working faces.

The Lloyd Entry—13 persons. The head of the entry is too far beyond the air. The air is not carried through the rooms on the left. The entry needs drainage.

The Face Entry on right of No. 1 entry, to the left of No. 3. The head is 73 feet beyond the air—13 feet too far.

First Left Entry off of No. 1. The head is 100 feet beyond the air—40 feet too far.

Head of No. 1 Entry, beyond No. 3. This 91 feet beyond the air; 31 feet too far.

No. 3 Entry, beyond No. 1—12 persons. The air is not turned into and carried through the rooms on the left, but, instead, is allowed to travel the entry. This must be remedied.

N. B. The air must be carried through the rooms on both sides of an entry, when there are rooms on both sides, and it must be kept up to within 60 feet or less of all working faces. See sections 3 and 10 of revised Mining Law.

No. 357.

CENTRAL JELLICO.

No. 357 (C. J. N.) FRANKFORT, August 12, 1893.

To John Phillips, Esq.,
Superintendent Central Jellico Coal Co.,
Pleasant View, Ky.,

DEAR SIR: You are hereby respectfully notified that on July 29, 1893, the date of inspection, an examination of your mine, the Central Jellico, showed it to be in the defective condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The four drifts, constituting one bank, are aired by one and the same current, and, with 71 to 74 persons in bank, there should be not less than 7,400 cubic feet traveling through the works; but the highest measurement—and that was taken in the most favorable place, *i. e.*, in the return to the furnace from the No. 14 drift (the furnace being on this drift)—showed only 2,469 cubic feet.

The air is not sent through the rooms on both sides of the entries, as the provisions of the law make necessary; but is sent only through those on the right, and then only through break-throughs that cut the pillars at the necks of the rooms. The air must be sent through the rooms on both sides of the entries, as they reach the 60-foot limit, and it must be kept up to within 60 feet or less of all working places, both in entries and rooms.

Doors off of rooms 6 and 8 in No. 17 drift cause all the work beyond to be ahead of the air.

The heads of drifts 15 and 16 are too far beyond the air.

Drift No. 17 needs drainage.

No. 358.

KENSEE MINE.

No. 358 (C. J. N.) FRANKFORT, August 12, 1893.

To Hywel Davies,
General Manager Main Jellico Mountain Coal Co.,
Kensee, Ky.

DEAR SIR: You are hereby respectfully notified that on July 31, 1893, the date of inspection, an examination of your mine, the Kensee, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The mine was not working at the time of inspection, and as the furnace was not fired, I could not determine the amount of air that is provided for the bank. I had, therefore, to confine my observations to the matter of distribution of air in the event of a current traveling through the works. On that point I made the following observations:

No. 21 Entry—The air apparently travels mostly on the entry, though doubtless some goes through the rooms on the right. The current must be sent through the rooms on both sides of the entry, as the 60-foot limit is reached, and it must be kept up to within 60 feet or less of all working places.

No. 22 Entry—The air is not sent through the rooms on the right. This must be remedied. See section 10 of revised Mining Law. (Section 11 of old law.)

No. 22 Back Entry—Five rooms are working here. There is no ventilation. The air is not turned into the entry at all.

No. 16 Entry—The head of the entry is 78 feet beyond the air; 18 feet too far. The air must be carried through the rooms on the right when the 60-foot limit is reached, and kept up to within 60 feet or less of all working faces.

No. 20 1-2 Entry—On this entry, in the vicinity of and back of the Face Entry that leads to No. 21 Entry, the timbers are breaking badly, in consequence of the crush in that part of the bank, and the place is in a dangerous condition. Part of the Face Entry, near its junction with 20½, is also involved.

N. B. The ventilating current must be carried through all rooms, on both sides of an entry, as they reach 60 feet in length, and it must be kept up to within 60 feet or less of all working faces.

No. 359.

DOWLAIS NO. 6.

No. 359 (C. J. N.) FRANKFORT, August 12, 1893.

To Philip Francis, Esq.,
Superintendent East Tennessee Coal Co.,
Jellico, Tennessee.

DEAR SIR: You are hereby respectfully notified that on July 13, 1893, the date of inspection, an examination of your mine, the No. 6 Drift Bank, of Dowlais Mines, showed it to be in the defective condition noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The No. 6 Drift Bank—69 persons. The current which supplies this bank is expected to also supply the "New Drift or New Bank," the latter receiving a split off the current which enters this one. Since there are 69 persons in this bank and 49 in that one, there should be not less than 11,500 cubic feet of air traveling this bank. But, instead, the highest measurement that could be obtained, where the air that serves the working places was traveling, showed only 5,255 cubic feet—too little for this bank alone.

No. 8 Entry—24 persons. There is plenty of air in this entry, but it does not reach the upper part of the work. The three rear rooms of the last four on the left have no curtains, hence the first, second and third rooms back from the head of the entry are beyond the air. Curtains should be hung on the rooms so as to bring the air up to the last one.

No. 9 Entry—16 persons. The 13th room, which leads the air from No. 8 entry, is open, and the air goes at once to the entry, leaving five rooms (14 to 18 inclusive) without sufficient air. The mouth of that room should be closed, and the current carried through the rooms No. 14 to 18 inclusive. The head of the entry is 109 feet beyond the course of the air; 49 feet too far.

No. 10 Entry—26 persons. There is no ventilation in this entry where needed. The atmosphere is very smoky and unhealthful. No provision is made for carrying the air through the rooms on the right; this must be remedied. On the Main between this entry and No. 9, I found 4,178 cubic feet of air, most of which must have come through part of this entry; but that is not more than enough for the 40 persons in No. 8 and No. 9 entries, through which the current has traveled; hence none of it is available for this entry, even were it traveling properly.

No. 360.

DOWLAIS MINE—NO. 3.

No. 360 (C. J. N.) FRANKFORT, August 14, 1893.

To Philip Francis, Esq.,
Superintendent East Tennessee Coal Co.,
Jellico, Tenn.

DEAR SIR: You are hereby respectfully notified that on August 1, 1893, the date of inspection, an examination of your mine, the "New Bank" (*i. e.*, No. 3 Drift), of Dowlais Mines, showed it to be in the defective condition noted herein, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

As stated in Notice 359, all air that comes to supply this bank is a split off the current that enters the No. 6 Drift, and that is not in sufficient volume to supply the requirements for that bank; hence this bank is entirely without its proper quantum of fresh air, and would not be even though the entire current that was measured in the first bank should be sent through this one. This bank, in other words, is simply receiving a split off a current of air that has already been fouled by traveling through the other bank, and the volume of the original current is not enough to satisfy the demands of the first bank it enters. Moreover, that split, even if fresh, is not sufficient for this bank.

The Ross Straight Entry—There is a great deal of water on this entry from the Jenkins to and into the air-course on the left, at the head of the entry. It should be drained. The men in the air-course are too far beyond the course of the air.

Ross No. 2 Entry—7 persons. A volume of 788 cubic feet of air is coming here, which would be just enough *if it was fresh;* but since this is air that has already traveled the No. 6 Drift, it can not be accepted as suitable for this place.

The Jenkins Entry—18 persons. What air there is, it must be remembered, is, for the reasons given above, necessarily not fresh, and is not acceptable as satisfying the requirements of the work here even were there volume enough—which there is not; since the highest measurement here shows only 1,692 feet of air, from which 700 feet must be subtracted on account of Ross No. 2 Entry. All rooms on the right are open, and since there is no break-through between rooms 5 and 6 the air must travel the entry down to room No. 6. There should be a break-through between rooms 5 and 6, and a curtain hung on the entry between the last two rooms (near the head), to send the current into the upper rooms and thence down through the lower rooms in orderly succession.

The Stone Entry—14 persons. The door on room 19 is down, hence the air goes direct to the furnace by it, and all the work is beyond the air—what there is of it, which is little, and that not fresh. There is no provision to send the ventilating current through the rooms on the left; this must be remedied. The head of the entry is 70 feet beyond the last room. There is much water at and in the vicinity of room 19; it must be drained.

N. B. As appears in the foregoing notes, this bank does not receive enough air, even were the current that comes to it fresh. The ba [illegible] e ventilated by a current distinct from that whi [illegible] gh the other bank—No. 6 Drift.

No. 361.

DIAMOND CO.

No. 361 (C. J. N.) FRANKFORT, August 14, 1893.

To William Thompson, Esq.,
Superintendent Diamond Coal Co.,
Altamont, Ky.

DEAR SIR: You are hereby respectfully notified that on August 3, 1893, the date of inspection, an examination of your mine, the Diamond, showed it to be in a defective condition, as regards ventilation and drainage in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

An ample amount of air is going through the furnace, but it is largely leakage that has been of no service to the working portions of the mine.

At the mouth of the first open room-neck on the right of the Main, beyond the door, I found 8,661 cubic feet of air, which would be sufficient for 86 persons under ground were it conducted so as to serve the places at which it is needed, but this is not done; hence the larger part of the bank is really without ventilation, as will appear from the observations recorded herein.

The First Left Entry—19 persons. There is no ventilation where needed; practically all the work is beyond the point where the air comes to the entry. The head of the entry is 181 feet beyond the air, and there are 9 rooms (5 on the left and 4 on the right) working on that stretch. The roof at the head of the entry is in a dangerous condition, and should be securely timbered. There is much water in the entry; it must be drained.

The Main Entry—9 persons. The air is not carried to the work on this entry, but is allowed to turn into the first room-neck (from which three rooms are broken off) on the right beyond the point at which the air comes to the entry from the first left entry's air-course.

Second Left Entry—6 persons. There is no ventilation for this entry. The atmosphere is very smoky, and charged with carbonic acid gas. The mouth of the entry is 139 feet ahead of the air.

Second Right Entry—2 persons. There is no ventilation for this entry. The mouth of the entry is still farther ahead of the air than is that of the Second Left.

Head of the Main Entry—2 persons. There is no ventilation here. The atmosphere is very smoky, so much so as to obscure objects. The head is 192 feet beyond the air. There is much water in this entry ; it must be drained.

First Right Entry—48 persons. Since there is no door on the fourth right room, the air goes to the furnace by way of the mouth of that room, and all work beyond said room is ahead of the air. Moreover, on account of the character of the doors used on the first three rooms, the doors are frequently left open (being difficult to close), and the air then goes to the furnace without doing any good to any of the work beyond the first room. The atmosphere is very smoky and unhealthful beyond the seventh room beyond the door on the entry. The head of the entry is 225 feet beyond the air.

Doors—The three doors on the entries, namely, that on the Main, that on the First Left, and that on the First Right, are open so continuously, and left open so long when the cars are running, that the ventilation is very irregular and unsatisfactory, even where there is a good current under better conditions. There should be a trapper to attend to these doors.

The Intake—The mouth of the intake air-course (outside) is half filled with slate and mud. It should be cleaned out.

N. B. The air must be sent through the rooms on both sides of an entry, when there are rooms on both sides, and it must be kept up to within 60 feet or less of all working faces, both in rooms and entries.

No. 362.

STAR MINE.

No. 362 (C. J. N.) FRANKFORT, August 14, 1893.

To the "Star Coal Co.,"
East Bernstadt, Ky.

DEAR SIR: You are hereby respectfully notified that on August 3d, 1893, the date of inspection, an examination of your mine, the Star, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

When inspected there was hardly any fire in the "furnace," and there was hardly any current; only 665 cubic feet on the Straight North. On the Broughton entry—which is expected to receive its air from an intake distinct from that which serves the North—there was practically no current.

I note the following statement made by Mr. Harrison, Mine Foreman, namely: "That when the 'new entry' is cut through to the North (it now lacks, by estimate, about 6 feet of being through), all work will be moved from the Broughton to the North and the New entries, until a way is cut across from the head of the Straight North to the head of the Broughton, and then all the ventilating current will be taken in at the New entry and carried up the Straight North, and thence across to and down the Broughton. Also, that 10 feet will be added to the stack of the present air-shaft at once; that the fire in the 'furnace' will be started earlier than is done now, and that it will be attended to regularly during the day."

N. B. The ventilating current must always be carried through the rooms on both sides of an entry, when there are rooms on both sides, that are up 60 feet or more, and kept up to within 60 feet or less of all working faces, both on entries and in rooms. This is not done at present on the Straight North.

No. 363.

LITTON MINE.

No. 363 (C. J. N.) FRANKFORT, August 14, 1893.

To C. Litton, Esq.,
President Litton Coal Co.,
East Bernstadt, Ky.

DEAR SIR: You are hereby respectfully notified that on August 4, 1893, the date of inspection, an examination of your mine, the Litton, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

There is practically no ventilation on the Williams, Cornelius and Carter entries, and the volume of air is very deficient on the King, Martin and Spivey entries. The "furnace" seems to draw most of its air through old rooms, from the mouth of Old Powell, which is of no service to the main portion of the bank. The fire in the "furnace" was smothered with slack when I first entered the bank, but even after it had been shaken up and was burning well, I could find only 933 cubic fee of air in the Spivey entry, where all the air for the bank should be traveling to the furnace.

No. 364.

EARLINGTON No. 9.

No. 364 (W. U. G.) FRANKFORT, September 4, 1893.

To Mr. J. B. Atkinson,
Vice-President and Treasurer St. Bernard Coal Co.,
Earlington, Ky.

DEAR SIR: You are hereby respectfully notified that on August 21st, the date of inspection, an examination of your mine, the Earlington No. 9, showed it to be in good condition, touching its ventilation, drainage and timbering, in compliance with the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

No. 365.

EARLINGTON No. 11.

No. 365 (W. U. G.) FRANKFORT, September 4, 1893.

To Mr. J. B. Atkinson,
Vice President and Treasurer St. Bernard Coal Co.,
Earlington, Ky.

DEAR SIR: You are hereby respectfully notified that on August 22, the date of inspection, an examination of your mine, the Earlington No. 11, showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

There is an abundent supply of air well distributed; the drainage and timbering are good.

No. 366.

DIAMOND MINE.

No. 366 (W. U. G.) FRANKFORT, September 4, 1893.

To Mr. J. B. Atkinson,
Vice-President and Treasurer St. Bernard Coal Co.,
Earlington, Ky.

DEAR SIR: You are hereby respectfully notified that on August 23d, the date of inspection, an examination of your mine, the Diamond, showed it to be in satisfactory condition, fully complying with the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

No. 367.

ST. CHARLES MINE.

No. 367 (W. U. G.) FRANKFORT, September 4, 1893.

To Mr. J. B. Atkinson,
Vice President and Treasurer St. Bernard Coal Co.,
Earlington, Ky.

DEAR SIR: You are hereby respectfully notified that on August 25, the date of inspection, an examination of your mine, the St. Charles, showed it to be in excellent condition with ample ventilation, drainage and timbering, in compliance with the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

No. 368.

HECLA MINE.

No. 368 (W. U. G.) FRANKFORT, September 5, 1893.

To Mr. W. F. Anderson,
Secretary and Treasurer Hecla Coal and Mining Co.,
Earlington, Ky.

DEAR SIR: You are hereby respectfully notified that on August 22d, the date of inspection, an examination of your mine, the Hecla, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The motive power at the mine is insufficient to, or else so arranged that it does not, run the ventilating fan with sufficient velocity and pull loaded trams at the same time. This causes the supply of air to be almost wholly suspended while pulling loaded trams. It should be so arranged that the velocity of the fan will not be thus interrupted. When not pulling loaded trams the ventilation is good. There should, however, be a break-through between rooms Nos. 6 and 7 off 1st West Entry. One has been started.

Just past room 7, off 1st West Entry, the inspection was stopped by a pond of water. With this exception the drainage is good.

The timbering is good.

No. 369.

COÖPERATIVE MINE.

No. 369 (W. U. G.) FRANKFORT, September 5, 1893.

To Mr. J. H. Brown,
President Coöperative Mining Co.,
Barnsley, Ky.,

DEAR SIR: You are hereby respectfully notified that on August 23, the date of inspection, an examination of your mine, the Coöperative, showed it to be in the condition noted in specifications attached, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

SPECIFICATIONS.

No. 369.

With 34 men in bank, there is entering the Line Entry at southwest side of first hill, which is the intake to the mine, a volume of 5,299 cubic feet of air per minute. This would be sufficient, if properly distributed and carried to the men at their working places; but much of it is allowed to waste before reaching them. At the southwest end of same entry there is but 2,622 feet of air traveling, showing a loss of 2,677 before reaching any men, and leaving only 2,622 feet, not enough for the 34 men in bank. Much of this loss is through the entrance to an old air-shaft; some at other points, to which attention was called during the inspection.

In rooms off the 6th Entry, near its face, and at the face of the entry, there are 11 men at work. A curtain should be hung across the entry so as to send the air through the rooms. At this point there is 1,992 feet of air traveling per minute, which is ample. In that part of the mine reached by the Short Entry there are ten men at work, with not enough air going to them to give a reading on an anemometer. The drainage and timbering here is also very bad.

I note the fact that this work is toward the "croppings," and the statement by Mr. Brown, President, and Mr. R. H. Jackson, Superintendent, that this work is soon to be abandoned. Meanwhile care should be taken to avoid disaster.

No. 370.

Oak Hill Mine.

No. 370 (W. U. G.) Frankfort, September 5, 1893.

To Mr. L. T. Stull,
Secretary Oak Hill Coal and Mining Co.,
Nortonville, Ky.

Dear Sir: You are hereby respectfully notified that on August 26th, the date of inspection, an examination of your mine, the Stull [Oak Hill], showed it to be in a defective condition, touching ventilation, drainage and timbering, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

You have provided no means of ventilation, and there is practically none in the mine. This is in violation of section 10 of the Mining Law. The air shaft, which has fallen in, should be put in order, and a furnace or fan supplied. More attention should be given to the drainage and timbering.

No. 371.

Empire Mine.

No. 371 (W. U. G.) Frankfort, September 5, 1893.

To Mr. W. T. Rutland,
Manager Empire Coal and Mining Co.,
Empire, Ky.

: You are hereby respectfully notified that on Au-
date of inspection, an examination of your mine,

the Empire, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

That part of the mine north of the shaft is in fairly good condition as to ventilation, drainage and timbering. On the south side of the shaft there are 18 men with not enough air going to them to give a reading on an anemometer. They are in very bad air. More must be sent to this part of the mine.

Near the entrance of 2d Right Entry off "Around the World" Entry, the roof is unsafe. This should be attended to.

No. 372.

DOVEY'S MINE.

No. 372 (W. U. G.) FRANKFORT, September 6, 1893.

To W. H. Dovey, Esq.,
Manager Dovey's Kentucky Mines,
Mercer's Station, Ky.

DEAR SIR: You are hereby respectfully notified that on August 29th, the date of inspection, an examination of your mine, the Dovey's Kentucky, showed it to be in a defective condition, touching ventilation, drainage and timbering, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Ventilation—With 26 miners, beside the day men—the exact number I do not know—"in bank," the total supply of air, as shown by measurement, taken about 75 feet in on Main Entry, is 3,832 cubic feet per minute. This would be barely sufficient, if it all reached the men in proper proportions at their working places. This it does not do; but is allowed to waste back to the fan before reaching the men. The brattices, doors and curtains must be repaired, and others supplied where needed, to conduct the air through the mine. In rooms off 5th South Entry, there are 15 men with not enough air; the current going to them is not strong enough to give a reading on an anemometer.

The face of 7th South Entry and room near the face to the right, 3 men in, are ahead of the air. It must be brought up. From top to bottom of the shaft air leaks to the fan. All this is lost from the mine. Better results would be obtained by setting the fan nearer that part of the mine now being worked. This would require a new shaft.

Timbering—Many of the timbers now in place are insecure, and should be replaced by new ones. This is especially true of the Main Entry, of the 2d room from the face of 7th South Entry, and of old rooms between 5th and 6th South Entries, now being used as a haulway from 7th South Entry.

Drainage—On Main Entry, between 3d and 5th South Entries, and between the mouth of water pipe on Main and its face, there is too much water. The safety-catches on the cages used to take men in and out of the mine are not good. In case of an accident they would be of no value.

One of the cages is without a cover; the other is partially so. See section 10 of the Mining Law.

No. 373.

HILLSIDE MINE.

No. 373 (W. U. G.) FRANKFORT, September 6, 1893.

To Mr. J. W. Lam,
President Hillside Coal Co.,
Mercer's Station.

DEAR SIR: You are hereby respectfully notified that on August 29th, the date of inspection, an examination of your mine, the Hillside, showed it to be in satisfactory condition touching ventilation, drainage and timbering, in compliance with the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

With 50 men in bank, there is a well distributed volume of 10,780 cubic feet of air per minute. This is ample. The drainage and timbering are good.

No. 374.

POWDERLY MINE.

No. 374 (W. U. G.) FRANKFORT, September 6, 1893.

To Mr. C. H. Hamilton,
Superintendent Greenville Coal Co.,
Powderly, Ky.

DEAR SIR: You are hereby respectfully notified that on August 29th, the date of inspection, an examination of your mine, the Powderly, showed it to be in defective condition, as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

There are 60 men in bank.

Measurement taken on 1st North Entry shows the total supply of air to the mine to be 3,915 cubic feet per minute. This is but little more than half the minimum amount required by law. See section 10 of the Mining Law. I observed that material is in place with which to build a new furnace. It should be built at once.

The 2d break-through from the face, between 1st and 2d North Entries, should be closed.

The timbering and drainage throughout the mine require attention.

I note the statement by Mr. Hamilton, that the Greenville Coal Co. has but recently gotten possession of this mine, and the further statement that it is intended to put it in good condition. When time has been given to accomplish this end, another and more thorough inspection will be made.

No. 375.

CENTRAL MINE.

No. 375 (W. U. G.) FRANKFORT, September 6, 1893.

To Mr. T. C. DuPont,
Superintendent Central Coal and Iron Co.,
Central City, Ky.

DEAR SIR: You are hereby respectfully notified that on August 29th, the date of inspection, an examination of your mine, the Central, showed it to be in defective condition, as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The inspection was made at night. The furnace fire had been "damped," but was shaken up and well supplied with coal by Mr. Dovey, who accompanied me through the bank; and again, by a member of the night force of timbermen, so that the furnace was burning well at the time of the measurements of air.

The first measurement was taken on the Main Entry near the over-cast, 7,600 cubic feet per minute was passing; on same entry near the mouth of 6th North there was but 5,703 feet passing. Just before the air is split at the mouth of 8th North and South Entries, the current was too weak to give a reading on an anemometer. The air does not waste much at any point that I could discover, but the current grows weaker as it travels, as indicated by the above statement.

According to statements of Messrs. Stephens and Dovey, there are 133 miners and 26 day men in the bank. They should have a great deal more air. Much of the timbering is giving away. This is especially true of Main Entry between 1st and 2d and 6th and 8th North Entries, and near room 20 off 7th South Entry.

New timbers should be put in at once. The drainage on 7th South Entry is bad.

No. 376.

MUD RIVER MINE.

No. 376 (W. U. G.) FRANKFORT, September 7, 1893.

To Mr. W. G. S. Anderson,
Superintendent Mud River Coal, Coke and Iron Co.,
Mud River, Ky.

DEAR SIR: You are hereby respectfully notified that on August 30th, the date of inspection, an examination of your mine, the Mud River, showed it to be in satisfactory condition, in compliance with the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

This mine has two furnaces giving separate systems of ventilation. The larger furnace off Davis Entry draws most of its air through a shaft at the head of Russell Entry. At this point, 10,934 cubic feet per minute is passing in. This is the supply for 41 men. It is an abundance. The inspection of this part of the mine was interrupted by firing shots (at 4:30 o'clock). I had, however, visited most of the passages and several rooms. So far as I had gone the air is well distributed, giving excellent ventilation. Air also passes to this furnace through the Main on Slope Entry. In the air course, near the furnace, 22,411 feet is passing.

The drainage and timbering is also good here. The furnace off the Hartler Entry ventilates the Williams & Hartler entries, and their rooms. There are 7 men at work here. The mouth of the Hartler Entry is the intake to this part of the mine. At this point 5,851 cubic feet of air is passing in—an ample supply. The face of Williams Entry is ahead of the air. It should be brought up. With this exception, the air is well distributed through this part of the mine.

No. 377.

ABERDEEN MINE.

No. 377 (W. U. G.) FRANKFORT, September 7, 1893.

To Mr. J. D. Render,
President Aberdeen Coal Mining Co.,
Morgantown, Ky.

DEAR SIR: You are hereby respectfully notified that on August 31, the date of inspection, an examination of your mine, the Aberdeen, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

At the time of the inspection most of the men had left the mine. Mr. Mains stated that 45 to 50 are at work in bank.

The air is taken in through an air-course off the right of Main Entry. A measurement at the mouth of this course shows 8,421 cubic feet of air per minute passing in. If properly conducted through the mine, this would give sufficient ventilation; but it is not so conducted. Another measurement, taken in same course, just before it reaches 1st Right Entry, gives only 2,400 feet, showing a loss of 6,021 feet. This escapes into the Main, and travels it and other entries, missing the working faces where it should go.

The face of the 1st Right Entry and rooms to the left are ahead of the air. It must be brought up.

There should be a break-through from the room off Main Entry to the left, to the 1st room off the right of 3d Left Entry, and a door or curtain placed across Main Entry so as to send the air through the break-through. Men in rooms off 3d Left Entry and at its face are ahead of the air. The break-through called for above will take it to them. Most of the men are in rooms off the right of 1st Left Entry. They have not enough air. If the evils above complained of are thoroughly corrected their supply will be greatly increased. Not a great deal of timbering has been done, but the roof, a strong rock one, seems good. This fact should not be relied on too far. The drainage is good.

No. 378.

ISLAND SHAFT.

No. 378 (W. U. G.) FRANKFORT, September 27, 1893.

To Messrs. McKenney & Stanley,
Island, Ky.

DEAR SIR: You are hereby respectfully notified that on September 19th, the date of inspection, an examination of your mine, the Island, showed it to be in the condition, noted below.

Statements herein are framed as if made on the day of inspection.

I note the fact that since the inspection of July 14, 1893, the hoisting shaft has been sunk and connected, under ground, with the air shaft. This is in the right direction to procure good ventilation, provided the means employed to create a draft through the mine are sufficient. You are now depending on the exhaust from the pump at the bottom of the air shaft for ventilation. As you were not running at the time of this visit, I could not determine the amount of air supplied in this way.

Section 10 of the Revised Mining Law requires that there "shall be provided and maintained for every such mine an amount of ventilation of not less than one hundred cubic feet of air per minute per person employed in such mine."

This is mandatory, and if the means now employed does not supply the required amount of air, a fan or furnace must be supplied.

No. 379.

NALL'S MINE.

No. 379 (W. U. G.) FRANKFORT, September 27, 1893.

To Mr. C. L. Nall,
Owensboro, Ky.

DEAR SIR: You are hereby respectfully notified that on September 20th, the date of inspection, an examination of your mine, the Nall, showed it to be in a defective condition, as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The current of air passing through the mine is rather weak, but would, perhaps, be sufficient, if the furnace-fire was kept well supplied with coal, and in good trim. At the time of inspection it had burned quite low.

The first room on Main Entry should be closed by brattice, and the curtain across the Entry at the entrance of this room should be taken down and hung near the third room on same Entry, so as to send the air through this room.

Section 10 of the Revised Mining Law requires that "at every mine operated by a shaft, there shall be provided an approved safety-catch and a sufficient cover over head, on all cages used for lowering and hoisting persons. And at the top of every shaft a safety-gate shall be provided."

These you have not supplied. It must be done. There is a safety-catch on one of your cages, but it is no account, and would be useless in case of an accident.

No. 380.

BRUCKS' MINE.

No. 380 (W. U. G.) FRANKFORT, September 27, 1893.

To Mr. A. R. Brucks,
Owensboro, Ky.

DEAR SIR: You are hereby respectfully notified that on September 20th, the date of inspection, an examination of your mine, the Brucks, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The timbering and drainage is very good. The door to the air shaft leading to the furnace will not shut close, and there are several breaks in the partition between the hoisting shaft and the upcast or air shaft. With these defects remedied, your mine would have sufficient ventilation. You have no safety-catches or cover overhead on the cages used for lowering and hoisting men, and no safety-gate at the top of the shaft. These must be provided. See section 10 of the Revised Mining Law.

No. 381.

FALCON MINE.

No. 381 (W. U. G.) FRANKFORT, September 27, 1893.

To Mr. John S. Adair,
Superintendent of Falcon Mine,
Falcon, Ky.

DEAR SIR: You are hereby respectfully notified that on September 21st, the date of inspection, an examination of your mine, the Falcon, showed it to be in a defective condition, touching ventilation and drainage, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

At a former inspection of this mine, made July 12, 1893, it was found to have insufficient ventilation and drainage. Since that date entries have been driven through the hill from "daylight to daylight," and you are now relying wholly upon natural ventilation. This is in direct violation of the Revised Mining Law, which requires that "all mines governed by this statute shall be provided with artificial means of producing ventilation, such as suction or forcing fans, exhaust steam, furnace, or other contrivance." See section 10. Your mine is governed by this statute. You must, therefore, provide for its ventilation. As you are now employing 36 miners and 7 day men, 43 in all, there must be at least 4,300 cubic feet of air per minute sent through the mine; more if the number of men is increased. The drainage is still very poor, and will continue so, or get worse, until ditches are cut by which to conduct the water to a sump or sumps (it may require more than one), from which it can be hauled or pumped. The condition of your mine is such that this is very necessary; it must be done.

No. 382.

NEW HOLLAND MINE.

No. 382 (W. U. G.) FRANKFORT, September 27, 1893.

To Mr. H. G. Simmons,
Superintendent of New Holland Mine.
Owensboro, Ky.

DEAR SIR: You are hereby respectfully notified that on September 22, the date of inspection, an examination of your mine, the New Holland, showed it to be in defective condition as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

No means has been provided for ventilation. This is in violation of the Revised Mining Law. A fan, furnace, or other contrivance, by which to send a current of air, through the mine, not less in volume than one hundred cubic feet per minute, per person employed in the mine, (there are now sixteen), must be provided. See section 10 of Revised Mining Law. Very little timbering has been done.

In the rooms, there is but one row of timbers set along the side of the track. This is insufficient to render the roof secure. More must be used.

The drainage in that part of the mine where men are at work is good.

No. 383.

MOUNTAIN ASH—NO. 4.

No. 383 (C. J. N.) FTANKFORT, October 5, 1893.

To T. J. Davis,
Superintendent of Mines, Jellico Coal Mining Co.,
Mountain Ash, Ky.

DEAR SIR: You are hereby respectfully notified that on September 28, 1893, the date of inspection, an examination of your mine, the No. 4 Drift Bank, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

With about 30 persons in bank, enough air enters, but it is not kept close enough to the work either in the Main Straight Entry or on the First Left. In the First Left, where there are two open break-throughs, the rear break-through should be closed. Air should be kept within 60 feet or less of all working faces, both in rooms and entries. (See Section 10 of the Mining Law.) Particular attention is called to this.

No. 384.

MOUNTAIN ASH—1 AND 3.

No. 384 (C. J. N.) FRANKFORT, October 5, 1893.

To T. J. Davis, Esq.,
Superintendent of Mines, Jellico Coal Mining Co.,
Mountain Ash, Ky.

DEAR SIR: You are hereby respectfully notified that on September 28, 1893, the date of inspection, an examination of your mine, the No. 1 and No. 3 Drift Bank, showed it to be in the defective condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The Lloyd Entry—about 10 or 15 persons, I understand, are in here. There is practically no ventilation beyond the 3d room on the right from the head of the entry. The air is not carried through the rooms on the left. The entry needs much better drainage in the vicinity of the 4th room on the right from the head. A stronger current of air should be sent to this entry.

The Face Entry, of No. 3 Drift—8 persons. The head is too far ahead of the air. See section 10 of the Mining Law.

First Left Entry, of No. 3 Drift—7 persons. The air returning from here, being the total volume entering at the mouth of the No. 1 Drift and coming from No. 3 Drift, amounts to 6,824 feet.

Keeping Air to the Face—Your attention is particularly called to the fact that the air must be kept within 60 feet or less of all working faces, both in rooms and in entry. Where rooms are opened on both sides of an entry, the air must be carried through those on each side that are up 60 feet, and it must be kept within 60 feet or less of the faces as they are advanced. See Section 10 of the Mining Law.

The Roof—The sand-rock roof of this mine, especially in the Lloyd Entry and in the No. 1, is treacherous on account of the clay seams in it. This necessitates not only close propping in the rooms, and the keeping of a line of props close to the face of the work, but, where the roof is cut by seams in the entry all "loose" or hanging ends of the rock should be supported by stout timbers—it is not wise to depend on the probability that the rock is keyed against the rib; and in places where there are two more or less parallel seams close together, inclosing a wedged-shaped piece, and, also, where the rock is shattered, cross-timbers should be set in.

No. 385.

WELSH MINE.

No. 385 (C. J. N.) FRANKFORT, October 6, 1893.

To Welsh Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on September 30, 1893, the date of inspection, an examination of your mine, the Welsh, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Plenty of air is provided for the number of persons employed, but it is not sent through the rooms as should be done, by the use of check-curtains. The air must be kept within 60 feet or less of all working faces, whether in rooms or in entries. See Section 10 [illegible] Mining Law.

The entries need better drainage. For the most part of their length they are very wet and muddy.

I noticed in some of the rooms that the props are not set close enough to the face. This matter should be watched.

The air-stack should be stripped.

No. 386.

PEACOCK MINE.

No. 386 (C. J. N.) FRANKFORT, October 5, 1893.

To the Peacock Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on September 30, 1893, the date of inspection, an examination of your mine, the Peacock, showed it to be in fair condition, except as noted below; said defects, as noted, being in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection,

There is not enough air sent into the Pump Entry. It will be best to put a door or curtain on the Swamp Entry, and send nearly all the in-take of air into the Pump Entry; and it should be sent closer to the head of the T. J. Dunaway Entry, there.

The Green Dunaway Entry—This entry has no ventilation. The air flows past its mouth. A door or curtain should be placed on the Swamp Entry so as to send the air into the old left-hand entry back of the Dunaway (the old left-hand Baker?), so that the current will go thence into the Green Dunaway entry. I understand that this entry (the Green Dunaway) is to cut into the Frisby, lacking now about 50 feet or less of being through; but until that is done, provision must be made to give it ventilation as indicated.

I understand that work will not be carried on in the Gough (left-hand) entry much longer. Until it is abandoned, however, whether it be soon or late, care must be taken (by regulating the supply going into the Green Dunaway) not to cut off its air when the Green Dunaway entry is connected with the Frisby.

Air to the Faces—Particular attention is called to the fact that the air must be carried through the rooms and kept within 60 feet or less of the faces, and that it must be carried through the rooms on both sides of an entry when there are rooms on each side. The chief cause of complaint now is connected with carrying air through the rooms.

I am glad to say that your mine is in a generally better condition than when last inspected. In fact, I believe it is in better condition than I have known it to be for several years.

No. 387.

PITMAN MINE—WEST.

No. 387 (C. J. N.) FRANKFORT, October 5, 1894.

To William McNeil, Esq.,
Superintendent Pitman Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on October 2, 1893, the date of inspection, an examination of your mine, the West Bank, showed it to be in a satisfactory condition as regards ventilation.

Statements herein are framed as if made on the day of inspection.

As you are aware, better drainage is needed in parts of the mine.

No. 388.

PITMAN MINE—EAST.

No. 388 (C. J. N.) FRANKFORT, October 5, 1893.

To William McNeil, Esq.,
Superintendent Pitman Coal Co.,
Pittsburg, Ky.

DEAR SIR: You are hereby respectfully notified that on October 2, 1893, the date of inspection, an examination of your mine, the East Bank, showed it to be in a satisfactory conditio [illegible]s ventilation, with the exception noted below, said exception being in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The air is not carried through the rooms on the right side of the Third Left Entry. I note your statement that this will be remedied at once.

No. 389.

LAUREL MINE.

No. 389 (C. J. N.) FRANKFORT, October 7, 1893.

J. W. Bastin, Esq.,
Superintendent Laurel Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on October 3, 1893, an examination was made of your mine, the Laurel. The inspection, however, was not satisfactory, since the furnace fire was allowed to die down while the examination was in progress, and attempted measurements of the amount of air supplied for ventilation were not, on that account, of any value after the Second Left Entry had been traversed.

It was evident that on the Second Left Cross Entry, and on the Second Left between the Cross and the head, the ventilation was insufficient.

It was also clear that on the Fifth Left Entry the rooms on the left are not sufficiently ventilated, even when the current is passing in full volume.

It will be necessary to make another inspection of the mine at an early day.

No. 390.

VICTORIA MINE.

No. 390 (C. J. N.) FRANKFORT, October 6, 1893.

To Victoria Coal Co.,
Pittsburgh, Ky.

DEAR SIR: You are hereby respectfully notified that on October 3, 1893, the date of inspection, an examination of your mine, the Victoria, showed it to be in the defective condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The ventilation generally is not satisfactory. Although an adequate quantity of air enters the Main Entry for the work supplied by it, the air seems to be lost before it reaches the points at which it is needed; at any rate it does not travel where it should. The supply for the work on the Fourth Right is insufficient.

Sixth Left Entry—10 persons. The air entering the Main entry should come to this entry by way of rooms connecting with the Fifth Left, and should reach the head of the entry; but curtains are off so many of the rooms on the left, thus letting the air pass at once to the entry towards its mouth, that the current does not go to the head of the work. Moreover, there is no provision (as a check-curtain) to turn the air into the rooms on the right, where about all the work now is (in 10 rooms), so that even were the current traveling far enough up the entry, it would leave these rooms without proper ventilation.

Seventh Right Entry—11 persons. There is no provision to cause the air to travel the rooms on the right. Check-curtains are needed on the entry, beyond the air course that leads to the Sixth Right, to cause the air to pass into said rooms. The roof is bad from the mouth of the entry nearly to the curtain that hangs across the entry near the air-course that leads to the Sixth Right. It needs careful attention. The entry needs better drainage in the vicinity of said curtain.

Main Entry Drainage.—The entry needs better drainage between Seventh and Sixth Right Entries.

Sixth Right Entry—3 persons. The roof is bad most of the way from the furnace to the mouth of the entry It needs careful attention.

While a volume of 8,488 cubic feet of air is coming to the furnace from the work supplied by the intake entering the Main Entry, very little comes from the work on the Fourth

Right—which has a distinct source of supply, and from which not less than 3,000 to 3,500 cubic feet should come.

Fourth Right Entry—30 to 35 persons. The ventilation is inadequate here, both on account of a lack of a sufficient volume of air, and because no provision is made to cause the air to travel the rooms. See section 10 of the Mining Law. The entry is very wet and muddy. The roof needs careful attention, especially in the work on that part of the entry in the vicinity of and beyond the junction with the 5th Right.

No. 391.

BEATTYVILLE MINE.

No. 391 (W. U. G.) FRANKFORT, October 21, 1893.

To Mr. Charles Hendrie,
General Manager Beattyville Coal Co.,
Beattyville, Ky.

DEAR SIR: You are hereby respectfully notified that on October 18th, the date of inspection, an examination of your mine, the Beattyville, showed it to be in satisfactory condition.

Statements herein are framed as if made on the day of inspection.

MEMORANDA.

Ventilation—Opening No. 1, with twenty men inside. A measurement taken on Main Entry, which is the intake, showed 12,470 cubic feet of air per minute to be passing in.

Opening No. 2, with thirty men inside. A measurement taken on Main Entry (the intake) showed 30,700 cubic feet of air per minute to be passing in.

Throughout both of these divisions of the mine the air is well distributed, reaching the men in ample quantities at their working places.

Timbering—In both divisions of the mine the timbering is good.

Drainage—There is but very little water in the mine, and this is well disposed of.

No. 392.

CRYSTAL CREEK MINE.

No. 932 (W. U. G.) FRANKFORT, October 21, 1893.

To Crystal Creek Coal Co.,
Beattyville, Ky.

DEAR SIR: You are hereby respectfully notified that on October 18, the date of inspection, an examination of your mine, the Crystal Creek, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

SPECIFICATIONS.

Ventilation—The entire system of ventilation at this mine should be changed. Air is being taken in by way of an old abandoned drift and rooms, so that it reaches the men charged with noxious gases generated in these old works. The air course, leading from these old works to the mine, should be closed by brattice, and the Main Entry to the mine be made its intake. With 22 men inside, there is entering the mine 3,570 cubic feet of air per minute. If this was pure air unpolluted by passage through the old works above referred to, it would be sufficient for the number of men employed, provided it was properly distributed and carried to the men at their working places, but this is not done.

The Main Entry and rooms turned off of it, from 1st Right Entry on, are ahead of the air. The last four rooms turned off the left of 1st Right Entry are without air.

The 1st Left Entry and three last rooms turned off of it are ahead of the air.

To all of these working places the air must be brought, and a circulation established and maintained so long as men are at work therein. Especial attention is called to section 10 of the Mining Law, which provides that "no working place shall be driven more than sixty feet in advance of a break-through or

d notice is hereby given that this regulation must be observed with reference to all working-places that are now, or may hereafter be driven in this mine.

Timbering—In the roof on 1st Right Entry, near its entrance, there is a split several feet long, along which one side of the roof has dropped about two inches. This broken part of the roof should be taken down or securely cross-timbered. Not enough timbering is done in the rooms. More props should be set. It is dangerous to trust, as much as is being done, to the strength of the roof.

Drainage—The mine is well drained.

No. 393.

AVENT MINE.

No. 394 (W. U. G.) FRANKFORT, October 21, 1893.

To Avent Beattyville Coal Co.,
Beattyville, Ky.

DEAR SIR: You are hereby respectfully notified that on October 18, the date of inspection, an examination of your mine, the Avent Beattyville, showed it to be in a defective condition as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as as if made on the day of inspection.

SPECIFICATIONS.

Ventilation—A measurement taken on Main Entry, near the furnace door, showed that there was passing in at this point 12,255 cubic feet of air per minute, an ample supply, if properly conducted, to ventilate the mine, but it is not so conducted. Another measurement taken on Main Entry, near 1st Right Entry, showed that two-thirds of the air that enters the mine escapes to the furnace before reaching this point. Past this point there is but little circulation of air; in places mentioned below, none.

The 1st Left Entry with two rooms next its face, the 2d Left Entry with last room turned, and the 3d Left Entry with last two rooms turned, are all ahead of the air.

At the time of the inspection (noon), shots were being fired in rooms off 1st and 2d Right Entries, so that I did not make a close inspection here. The air must be brought up to the working places in all of the above mentioned rooms and entries, and a circulation established and maintained while men are at work therein.

Your attention is especially called to section 10 of the Mining Law, which provides that "no working place shall be driven more than sixty feet in advance of a break-through or air-way." And you are hereby notified to observe this regulation with reference to all working places that are now or may hereafter be driven in your mine.

Timbering—At and near the entrance of Main Entry the timbering is not as secure as it should be. No timbering is done in the rooms. This is trusting to a dangerous extent in the strength of the roof. Props should be set in all where men are at work.

Drainage—The drainage is good.

No. 394.

TORCHLIGHT MINE.

No. 394 (W. U. G.) FRANKFORT, November 4, 1893.

To Col. Jay H. Northup,
General Manager Torchlight Coal Co.,
Louisa, Ky.

DEAR SIR: You are hereby respectfully notified that on October 25th, the date of inspection, an examination of your mine, the Torchlight, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Ventilation—At the time of the inspection the air was good, but it can not be relied upon to stay so, as no artificial means of ve[illegible] has been adopted.

[illegible] the Mining Law provides that "all mines governed by this statute shall be provided with artificial means of producing ventilation, such as suction or forcing fans, exhaust steam, furnace or other contrivances." This section must be complied with.

Timbering—This is very good.

Drainage—The drainage is excellent.

No. 395.

WHITE HOUSE MINE.

No. 395 (W. U. G.) FRANKFORT, November 4, 1893.

To Col. Jay H. Northup,
Gen. Superintendent Whitehouse Coal Co.,
Louisa, Ky.

DEAR SIR: You are hereby respectfully notified that on October 25th, the date of inspection, an examination of your mine, the Whitehouse, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Opening No. 3—The drainage is good.

The timbering seems sufficient and the roof secure, except at a point near the face of Main Entry, there is a long crack in the roof (to which attention was called at the time of the inspection). The slate on either side of this crack should be knocked down, or else securely cross-timbered.

Opening No. 4—The Main Entry was "working," so that I did not inspect this opening.

Opening No. 5—On stumps. In fair condition.

Opening No. 6—The drainage here is good.

In this opening but little timbering has been done. There is a rock roof which seems strong. It should, however, be closely watched, and its strength not relied on too far to the exclusion of timbers.

No provision has been made for the artificial ventilation of this mine. This must be done. See Section 10 of the Mining Law.

No. 396.

SANDY RIVER MINE.

No. 396 (W. U. G.) FRANKFORT, November 6, 1893.

To Sandy River Cannel Coal Co.,
Myrtle, Ky.

DEAR SIR: You are hereby respectfully notified that on October 25, the date of inspection, an examination of your mine, the Sandy River, showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

Work is confined to 2d Left Entry and rooms turned off of it; and this inspection extended through, and this notice covers only that part of the mine.

Ventilation, drainage and timbering is very good.

No. 397.

ELIZABETH MINE.

No. 397 (W. U. G.) FRANKFORT, November 4, 1893.

To Mr. W. S. Howell,
General Manager Great Western Mining and M'f'ing Co.,
Peach Orchard, Ky.

DEAR SIR: You are hereby respectfully notified that on the night of October 25th, the date of inspection, an examination of your mine, the Elizabeth, showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

This inspection extended through, and this notice covers 4th, 5th, 6th and 7th right, and 7th, 8th, 9th and 10th left entries, and rooms turned off of them. With 75 miners, and 20 to 25 day-hands employed inside, there is entering the mine 14,370 cubic [illegible] of air per minute. This is very well distributed, af-
[illegible] ventilation to the working places.
[illegible] is good.

At some places along the entries the slate has fallen until the rock above the slate has been reached; giving a height of from 10 to 15 feet to the entries at these places.

When such places are not timbered, great care should be taken that no loose slate is left on the side of the entries and above the height of a man; except this danger, the entries appear in safe condition, but great care must be exercised with reference to the draw slate.

No. 398.

RUSH No. 6 MINE.

No. 398 (W. U. G.) FRANKFORT, November 4, 1893.

To Ashland Coal and Iron Railway Co.,
Ashland, Ky.

DEAR SIR: You are hereby respectfully notified that on October 27, the date of inspection, an examination, of your mine, the Rush No. 6, showed it to be in satisfactory condition as noted below.

Statements herein are framed as if made on the day of inspection.

A measurement taken on 4th Left near Ketchen Entry showed 4,500 cubic feet of air per minute to be passing this point; this is the supply to 18 men in rooms off 4th and 5th Left Entries. It is enough.

Air on Davis air-course; supply to 28 men on cross entry and in rooms between 7th and 8th Left entries; 4,600 cubic feet per minute.

This is sufficient.

Air on Hammin's Entry, supply to 52 men in rooms to the left, 6,800 cubic feet per minute. Ample.

When the rooms off Hammin's Entry shall have been driven farther than 60 feet in, which will be soon, curtains or doors must be so placed as to send the air off the entry through the rooms.

The mine is well timbered and drained.

No. 399.

STINSON MINE.

No. 399 (W. U. G.) FRANKFORT, November 4, 1893.

To Lexington and Carter County Mining Co.,
Mount Savage, Ky.

DEAR SIR: You are hereby respectfully notified that on October 28th, the date of inspection, an examination of your mine, the Stinson, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

SPECIFICATIONS.

Opening No. 2—With 6 miners and 1 day-hand inside. This part of the mine is on stumps, which are being pulled. This fact considered, the drainage, though not good, will do. The roof is standing very well, though no timbers have been used on the entries except at the entrances.

The ventilation is good.

Opening No. 3—With 28 men employed inside. There was no fire in the furnace. This should never be the case. Every entry is driven through the hill from "day-light to day-light," but no doors or curtains are used to conduct the air to the working places. Unless this is done, the air will pass along some entry, the nearest and most open-way to the furnace, missing the men in the places where it should go.

The timbering and drainage here are good.

Opening No. 6—With 17 men employed inside. In this opening the rooms are well timbered; but no timbering is done on the entries, except at the entrances. Still no loose slate was discovered, and the roof seems to be safe.

The drainage is very good.

This opening is without artificial means of producing ventilation.

Section 10 of the Mining Law requires that "all mines gov- this statute shall be provided with artificial means of producing ventilation, such as suction or forcing-fans, exhaust-steam, furnace, or other contrivances." The same section also provides "that no working place shall be driven more than 60 feet in advance of a break-through or air-way."

This section must be complied with throughout this mine, in all working places that are now or may hereafter be driven.

No. 400.

MUSIC MINE.

No. 400 (W. U. G.) FRANKFORT, November 6, 1893.
To Lexington and Carter County Mining Co.,
Mt. Savage, Ky.

DEAR SIR: You are hereby respectfully notified that on October 28th, the date of inspection, an examination of your mine, the Music, showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

This mine is nearly worked out; there are but six stumps left in the Johnson and ten in the Fitch Entry.

This stage in the progress of the mine considered, its condition is quite good.

No. 401.

STRAIT CREEK MINE.

No. 401 (W. U. G.) FRANKFORT, November 6, 1893.
To Strait Creek Coal Co.,
Denton, Ky.

DEAR SIR: You are hereby respectfully notified that on October 30th, the date of inspection, an examination of your mine, the Strait Creek, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

SPECIFICATIONS.

That part of the mine north of Main Entry is on stumps and pillars. There are frequent openings to "day-light," and this is relied on for ventilation. At the time of the inspection the air was good, but the absence of artificial means of ventilation is a violation of Section 10 of the Mining Law.

That part of the mine south of Main Entry is ventilated by a furnace. A measurement showed it to have a draft of 14,994 cubic feet of air per minute, which, if well distributed, would afford ample ventilation.

There is entering by way of an air-course to the left of and parallel with 1st Left Entry, 2,660 cubic feet of air per minute. This is the supply for 28 men at the face of this air-course and entry, and in rooms turned off of them, and in rooms turned to the left off South Howe Entry. More air must be sent to this part of the mine. It can be taken from Howe Entry, where there is more than enough.

The rooms are very well timbered.

On the entries very little timbering is done.

There is about 3 feet of slate above the coal. It does not stand well, but falls out to the rock above it. This must be carefully watched, and all loose slate taken down.

Throughout the mine the drainage is excellent.

No. 402.

ABERDEEN MINE.

No. 402 (W. U. G.) FRANKFORT, November 8, 1893.

To Aberdeen Coal Co.,
Morgantown, Ky.

DEAR SIR: You are hereby respectfully notified that on November 6th, the date of inspection, an examination of your mine, the Aberdeen, showed it to be in satisfactory condition, as noted below.

Statements herein are framed as if made on the day of inspection.

The suggestions made in a former notice, after an inspection made August 31, 1893, have been complied with, with good results.

The air-courses have been brought up, and with 30 to 40 men employed inside, there is now 14,379 cubic feet of air per minute, well distributed through the mine.

More attention is being paid to the timbering.

The drainage is excellent.

No. 403.

DEKOVEN 3 FOOT.

No. 403 (C. J. N.) FRANKFORT, November 20, 1893.

To S. P. Sturgis, Esq.,
Secretary Ohio Valley Coal and Mining Co.,
DeKoven, Ky.

DEAR SIR: You are hereby respectfully notified that on November 15, 1893, the date of inspection, an examination of your mine, the "Three-foot," showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

An ample amount of air is provided for the bank. A volume of 3,029 cubic feet was measured.

In the work on the right hand level the ventilation is satisfactory. But a sufficient proportion of the volume which enters the No. 3 room (now an entry) on the left level does not reach the working places on No. 13 room (now an entry), to satisfy the health demands of the persons there. The places are hot. The air that enters does not traverse the present working places, but goes to the return air-course, on the left of the "Entry" (No. 13 room), before reaching the places on the right and at the head of the entry, where it is most needed. More air should be sent through the entry (No. 13 room), in order to lower the temperature and render the atmosphere more wholesome, and it should be carried through the working places so as to keep within 60 feet or less of the faces. See sections 3 and 10 of the Mining Law.

No. 404.

DEKOVEN 4-FOOT.

No. 404 (C. J. N.) FRANKFORT, November 20, 1893.

To S. P. Sturgis, Esq.,
Secretary, Ohio Valley Coal and Mining Co.,
DeKoven, Ky.

DEAR SIR: You are hereby respectfully notified that on November 15, 1893, the date of inspection, an examination of your mine, the "Four-foot," showed it to be in the defective condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The volume of air supplied is too small for the 30 or 40 persons in bank—the highest measurement, taken near the entrance to the main air-course leading to the furnace (being the "return air," and having the leakages included), showing a volume of only 3,115 cubic feet. What air there is is not properly distributed to the working-places, no provision (as doors or check-curtains) being used to send the current regularly and systematically through the rooms, so as to keep the air within 60 feet or less of the faces. This applies both to the left and the right levels. The atmosphere at the head of the right-hand level is very smoky. The face of this level is about 33 feet too far beyond the air, being 93 feet beyond the last break-through to the air-course.

Keeping Air to the Faces—Your attention is particularly called to the fact that the air must be kept within 60 feet or less of all working faces, both in rooms and in entry. This must be done systematically and continuously in all working portions of the mine. You are not doing so now. You are referred to sections 3 and 10 of the Mining Law, and are hereby notified to observe this regulation with reference to all working-places (room and entry) that are now, or may hereafter be, driven in your mines.

No. 405.

DeKoven No. 9.

No. 405 (C. J. N.) FRANKFORT, November 20, 1893.

To S. P. Sturgis, Esq.,
Secretary Ohio Valley Coal and Mining Co.,
DeKoven, Ky.

DEAR SIR: You are hereby respectfully notified that on November 14, 1893, the date of inspection, an examination of your mine, the No. 9 Slope, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

Although only a few persons were under ground on the day of inspection, I was informed by Mr. Whitehead that work would be fully under way again in two or three days from that date.

Doors and check-curtains are needed to direct the air properly to the working places. There are none now in the mine; hence there is practically no ventilation in right hand levels, and practically none in the Second and Third Lifts.

Your attention is directed to the provision requiring a second outlet.

Keeping Air to the Faces—On this point, see statement made in reference to the matter in Notice 404.

No. 406.

McHenry Mine.

No. 406 (C. J. N.) FRANKFORT, November 22, 1893.

To C. W. Taylor, Esq.,
Secretary and Superintendent McHenry Coal Co.,
McHenry, Ky.

DEAR SIR: You are hereby respectfully notified that on November 17 and 18, 1893, the date of inspection, an examination of your mine, the McHenry, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

NORTH SIDE.

Seventh North Entry—21 persons. Plenty of air is sent to the entry, but it is loaded with black-damp, and is not, therefore, fresh and wholesome. The seven rooms between No. 33 and No. 41 do not get sufficient air, nearly the entire volume going to the entry at and back of the room 33, in consequence of the absence of curtains.

Seventh North Air-Course—19 rooms. Plenty of air comes to this air-course, but it is charged with black-damp. There is no provision made for causing the air to travel the rooms. All rooms below (outside) the sixth room back from the head of the air-course need to have the current sent through them.

Eighth North Entry—13 persons. Plenty of air comes to this entry, and it is much fresher than that traveling the Seventh, since a large proportion of the volume comes up the Main. Additional break-throughs are needed between rooms 1 and 2, and 2 and 3, and the air needs to be carried nearer to the faces; since there are no curtains on any of the rooms, the air is constantly losing to the entry. There are two open break-throughs to the air-course; the rear one should be closed. The roof is tender and breaking at and beyond No. 10 room; it should receive vigilant attention. The air should be sent through the rooms.

Ninth North Entry—5 persons. Plenty of air is coming to the entry. I measured 12,140 cubic feet near the mouth of the entry. The roof is dangerous. It requires very careful attention.

Ninth North Air-Course—2 persons. The roof is dangerous. It requires very careful attention.

The Main Entry—The head of the entry is 66 feet ahead of the air. There should be another break-through to the air-course. In the present break-through I measured 10,402 cubic feet of air.

South Side.

Ninth South Entry—6 persons. Plenty of air comes to the entry, but there are three open break-throughs between the entry and its air-course. The outside two should be closed. The current should be sent through all the rooms that are up 60 feet or more, so as to keep within 60 feet or less of the faces.

Ninth South Air-Course—2 or 3 persons. The roof is bad and breaking in in places. It needs very careful attention.

Eighth South Air-Course—12 or 13 persons. Plenty of air is received here. The roof is bad in a number of places, particularly towards the head. It requires very careful attention.

Eighth South Entry—about 12 persons. Plenty of air is received. The 10th room from the head needs more props near the face.

No. 407.

Sturgis Mine.

No. 407 (C. J. N.) Frankfort, November 22, 1893.

To Col. Jordan Giles,
Lessee of Sturgis Coal & Coke Co.'s Mine.
Sturgis, Ky.

Dear Sir: You are hereby respectfully notified that on November 16, 1893, the date of inspection, an examination of your mine, the Sturgis, showed it to be in fairly good condition, with exceptions noted below that are in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The maximum volume of air entering the mine amounts to 9,678 cubic feet; there may be about 10,000 cubic feet under favorable conditions. The throat of the fan compartment of the shaft is too small to permit the passage of the volume of air that the fan is capable of producing under favorable circumstances. At the speed the fan travels now, it ought to produce a current of at least 20,000 or 25,000 cubic feet.

The bratticing and stoppings of the mine are, generally, excellent. Comparatively little air is lost in its course through the east side and up to the Fourth Southwest Entry ; but the current does not reach all the faces of the working-places as satisfactorily as it should, as will appear in the following notes:

It is proper to state that the condition of the bank is very much better than was true when last inspected.

EAST SIDE.

Second East Entry—The head of this entry is far enough up for another break-through from the 1st East. Too much of the air is allowed to travel on the entry instead of through the rooms.

Fourth Southeast Entry—The head is too far away from the air. The current should be carried up into the entry so as to comply with the provisions of Section 10 of the Mining Law.

Third Southeast Entry—The head is too far away from the ventilating current. The air should be carried up into the entry and kept within 60 feet or less of the working faces.

Second Southeast Entry—The head is too far away from the ventilating current. I note, however, that another break-through to the First Southeast is nearly through, which will bring the air up when the rear break-through is closed.

WEST SIDE.

A volume of 5,704 cubic feet of air was measured coming into the 2d West Entry just beyond the trap door to supply this side.

Second Southwest Entry—No work here. Some fire-damp was detected at the head of the entry, and further back on the entry the gas is evolved freely. Abundant air should be sent through this place, so as to keep it free from standing gas, and the place should be fenced off and a warning board set up.

First Southwest Entry—Fire-damp is also evolved in a room to the left of the foregoing, which I understand to be on the First Southwest Entry. It is now collected, at the feeder, under a powder-keg, and burned. Plenty of air should be sent through here, and a warning board should be set up. No work here.

Note—Attention is directed to the specification in Section 10 of the Mining Law in regard to fire-damp.

Second West Entry—There are 25 rooms broken off of this entry beyond the 4th Southwest; 17 or 18 of which are up about 60 feet or more. The air is not sent through them, but is allowed to travel the entry altogether. The air must be turned into and carried through all that are up 60 feet or more, in accordance with the requirements arising under Section 10 of the Mining Law.

Keeping Air to the Faces—Your attention is particularly called to the fact that the air must be kept within 60 feet or less of all working places, both in rooms and in entry. This must be done systematically and continuously in all working portions of the mine. You are referred to section 10 of the Mining Law, and you are hereby notified to observe the regulation with respect to all working places (room and entry) that are now or may hereafter be driven in your mine.

Second Outlet—A second outlet is required for the mine A notice to this effect was given to the Sturgis Coal and Coke Co. Subsequently, under the impression that a shaft was to be put down, and connection made by driving an entry about 450 or 500 feet long, and that the work was in progress, assurance was given by me to the then President, F. C. Mills, that in the event the work could not, despite all exertions, be completed within the 60 days first allowed—as I felt satisfied it could not be—he could count upon an extension of time up to the last limit. The limit expired about the middle of last June. Until my recent visit to DeKoven and Sturgis, I believed that the second outlet had been completed—pressure of work in other directions having prevented a visit in the summer or early fall. The matter of the company's failure to comply with the law has been referred to the proper authorities. *Your* liability, I presume, dates from November 15th, the day upon which you took possession as lessee.

No. 408.

MADISONVILLLE MINE.

No. 408 (C. J. N.) FRANKFORT, November 22, 1893.

To C. E Morton, Esq.,
Secretary and Treasurer Madisonville Coal Co.,
Madisonville, Ky.

DEAR SIR: You are hereby respectfully notified that on November 13, 1893, the date of inspection, an examination of your mine, the Madisonville, showed it to be in fairly good condition, with exceptions noted below, that are in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

West Side.

There is an ample volume of air traveling on this side, but it does not properly traverse some of the rooms, as will be noticed below.

First West Entry—2 persons. Fire-damp is evolved at the face of the sixth room. The air current is not regular between rooms 6 and 7. This should be remedied.

Second West Entry—14 persons. The air is not properly carried through rooms 11, 12, 13. The face of the 13th room is 64 feet beyond the course for the current, and there is no current, practically, traveling through the room. The face of the 12th room is practically 75 feet beyond the air; there is a small hole at 50 feet back from the face, but it is not of much service. The face of room 11 is 85 feet beyond the air. The check-curtain on the entry, now between rooms 8 and 9, should be moved up, so as to throw the current through the upper as well as lower rooms. No. 4 room needs another row of props.

East Side.

An ample volume of air travels this side, but it does not pass close enough to the faces of some of the rooms, as is indicated below.

First East Entry—15 persons. Additional breakthroughs are needed between rooms 6 and 7 and 7 and 8; the 8th room is 70 feet beyond the break-throughs from it to rooms 7 and 9.

The air comes to the entry from room 12.

Considerable fire damp is evolved at the head of the entry, as shown by the safety-lamp.

Second East Entry—Considerable fire-damp is evolved at the head of the entry. The curtain now on entry between rooms 6 and 7 should be moved up, or another one hung farther up, so as to send the air sufficiently well through the upper rooms. There is hardly any current passing from room 12 to 13. The face of [illegible] 72 feet beyond the break-through to room 13; another break-through should be made and the rear one closed, so as to send the air to the face. There are only 2,631 cubic feet of air passing between rooms 10 and 11 out of 10,031 that enter the 7th room, and this goes almost immediately to the entry. The face of room 7 is 135 feet beyond the break through from 8. The required second break-through has been marked, but no such distance beyond the air should be risked in this mine. The face of room 3 is 73 feet beyond the break-throughs to 4 and 2. The face of room 2 is about 120 feet beyond the break-through to 3, but the fact that it is only 30 feet beyond that to room 1 assures it plenty of air when the rear break-throughs are closed. There is a volume of only 5,671 cubic feet of air passing through the break-through from room 1 out of a total volume of 28,396 feet that starts from the 1st West entry, showing large leakages between this point and the work on the West side.

Third East Entry—7 persons. There are only 8,850 cubic feet of air passing from the Fourth East to this entry out of the 28,396 feet that started from the fan. There appears to have been a large loss on the South Main, near the Second East entry.

Fire-damp—Attention is called to the specifications relating to fire-damp in Section 10 of the Mining Law. The matter of daily inspections with the safety-lamp should not be neglected. The good fortune which has attended the working of the mine this far does not warrant a cessation of vigilance.

No. 409.

REINECKE MINE.

No. 409 (C. J. N.) FRANKFORT, November 22, 1893.

To Inkerman Bailey, Esq.,
Secretary Reinecke Coal Co.,
Madisonville, Ky.

DEAR SIR: You are hereby respectfully notified that on November 11 and 13, 1893, the date of inspection, an examination of your mine, the Reinecke No. 11, showed it to be in fairly good condition, with the few exceptions noted herein that are in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

1st AND 2d EAST SPLIT.

This includes the air for the 1st and 2d East Entries. Twenty persons are engaged on those entries. An ample volume of air is provided, and it is, in general, well conducted. (Volume of air 13,406 to 17,037.)

First East Entry—In the long-wall workings, the preliminary narrow work should be ventilated by carrying the air along with brattices. A rear break-through now between rooms 24 and 25 should be closed.

Second East Entry—Fire-damp is evolved in rooms 23 and 25. The rear break-through between rooms 22 and 23 should be closed. The air should be carried closer to the face of room 13.

3D AND 4TH EAST SPLIT.

This includes the air for the 3d and 4th East Entries. About 18 persons are employed on those entries. An ample volume of air (11,455 cubic feet) is provided, and it is generally well distributed.

Fourth East Entry—The rear break-through in room 1—said room now being used as an air-course—should be closed. It had a door, but the door is down. Fire-damp is evolved freely in room 4; the air should be made to fully sweep the place so as to prevent any accumulation of the gas. In the break-through for the course of the air between rooms 6 and 7, the current is very irregular—sometimes "dead;" due, according to Mr. Feger, to a torn curtain on room 4. This should be remedied.

The break-through between rooms 8 and 9 is partially closed by a fall, which clogs the current.

Third East Entry—The air is well conducted here.

OLD FAN SPLIT.

This is the split of air that serves the South Main, 5th and 6th and 6th West, and 3d and 4th West Entries, in the order named. An ample amount of air is provided (12,126 cubic feet), and it is generally well conducted.

Fifth East Entry—Another break-through is needed to the 6th East Entry. I note that it is in course of making.

Fourth West Entry—The roof is bad in room 5, towards the face, on account of slips. It needs careful attention. Another break-through is needed between rooms 6 and 7, and the rear one closed. The head of the entry is 91 feet beyond the last break-through to the 3d West. I note that there is an incomplete break-through at 31 feet from the head.

First West—There is some fire-damp, noticeable on the safety-lamp, in the left hand upper corner of room 23. The head of the entry is 65 feet beyond the break-through from No. 2 West, and it is in a large slip. Considerable fire-damp is evolved at the head. Air should be carried by brattice until the slip is passed and another break-through made, or another break-through should be made back of the slip.

Second West Entry—Fire-damp is evolved at the head. The head is somewhat farther ahead of the air than is that of 1st West. It should not be driven farther before the air is brought up.

No. 410.

CUMBERLAND MINE.

No. 410 (C. J. N.) FRANKFORT, November 22, 1893.

To Geo. H. McCartney, Esq.,
Superintendent Cumberland Coal Co.,
Sturgis, Ky.

DEAR SIR: You are hereby respectfully notified that on November 16, 1893, the date of inspection, an examination of your mine, the "Wardlaw" [Cumberland], showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

With the number of persons in bank on the day of inspection, about 60, it is necessary to keep a fire in the furnace constantly, in order to secure a sufficient air-current in all the working-places. There was no fire when I entered the mine to begin the inspection. I had one built.

Bottom Level, East Side—7 persons. Another break-through is needed in the No. 1 room to bring the air within proper distance of the face. The head of the entry is 75 feet beyond the air, 15 feet too far.

I note that another break-through to the air-course has been started. The air-course lacks 7 or 8 feet of being up far enough to catch the latter.

Bottom Level, West Side—12 persons. The head of the entry is 60 feet beyond the air. Another break-through is required.

Upper Level, East Side—15 persons. Although a volume of 2,403 cubic feet of air is entering from the opening into the Layman Mine, at the head of the entry, it is not carried through the rooms as is required under the provisions of section 10 of the Mining Law. Check curtains should be placed on the entry so as to cause the current to travel within 60 feet or less of the working faces.

Upper Level, West Side—22 persons. There are three open break-throughs between the entry and its air-course. The two rear ones should be closed. There are 5 rooms above the outside open break-through.

Second Outlet—I understand from you that your company has authority to use the Layman Mine as your second outlet, as was the case with Mr. Wardlaw, your mine being connected with that one. Should this prove to be a mistake, a second outlet, in accordance with section 9, is required.

No. 411.

HECLA MINE.

No. 411 (W. U. G.) FRANKFORT, November 24, 1893.

To Hecla Coal and Mining Co.,
Earlington, Ky.

DEAR SIR: You are hereby respectfully notified that on November 9, the date of inspection, an examination of your mine, the Hecla, showed it to be in satisfactory condition.

Statements herein are framed as if made on the day of inspection.

With thirty men employed "inside," there is passing into the mine 19,972 cubic feet of air per minute. This is ample. The air is well distributed to the working places.

The timbering and drainage are good.

No. 412.

J. L. M. ROBERTSON'S MINE.

No. 412 (W. U. G.) FRANKFORT, November 24, 1893.

To Mr. J. L. M. Robertson,
Earlington, Ky.

DEAR SIR: You are hereby respectfully notified that on November 9, the date of inspection, an examination of your mine, the "Peacock No. 11," showed it to be in defective condition as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

There were six miners and a driver employed in this mine at the time of this inspection. Mr. W. T. Neal, the Bank Boss, stated that "seven or eight men were working inside."

Mines in which more than five persons are employed are subject to the provisions of the Mining Law.

You must provide for your mine some artificial means of ventilation, with capacity to produce and maintain a supply of one hundred (100) cubic feet of air per minute per person employed under ground.

See section 10 of the Mining Law.

Very little timbering has been done; the roof is unsafe, be cause of the lack of sufficient timbers, which must be supplied.

The drainage is good.

No. 413.

Providence Mine.

No. 413 (W. U. G.) Frankfort, November 24, 1893.

To Mr. W. L. Barnes,
Secretary Providence Coal Co.,
Providence, Ky.

Dear Sir: You are hereby respectfully notified that on the night of November 10, the date of inspection, an examination of your mine, the Providence No. 1, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

In that part of the mine ventilated by a fan, there are 70 men employed, with a supply of 14,433 cubic feet of air per minute. This air is well distributed to the men in their working places.

The Fugit Entry and rooms turned off of it is ventilated by a furnace. At the time of this inspection there was no fire in the furnace. The furnace must be kept fired at all times when men are working in the part of the mine ventilated by it.

That part of Main Entry passing through old works requires some more timbers at points pointed out to Mr. Roland. Except this, the mine is very well timbered. The drainage is good.

No. 414.

Spottsville Mine.

No. 414 (W. U. G.) Frankfort, November 25, 1893.

To T. Shiver & Bro.,
Spottsville, Ky.

Dear Sir: You are hereby respectfully notified that on No-
14, the date of inspection, an examination of your mine,
sville, showed it to be in the condition noted below, in

violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

SPECIFICATIONS.

Ventilation—A measurement taken on the air-course at a point near Main Entry, showed 11,580 cubic feet of air per minute to be passing into the mine. This, if well conducted through the mine, would ventilate it very well, but much of the air is lost before reaching the places it is needed.

On the 1st Right Entry only 8,228 cubic feet of air was found to be passing per minute, a loss of 3,352 cubic feet; 2,574 cubic feet of this loss is through a curtain across Strait Entry. A brattice or door should be put where this curtain now hangs. There is 2,625 cubic feet of air per minute passing on the O'Neal Entry. This is enough for the men (24) employed in this part of the mine, but that it may reach them, the rooms turned off this entry must be connected, one with another, by breakthroughs, and curtains so hung across the entry as to send the air through the rooms. Curtains should be hung across the Vancleave Entry so as to send the air into the rooms turned off of it. There are 16 men in these rooms, and 2,002 cubic feet of air per minute passing on the entry.

Timbering—The roof on Main Entry near the 2d lieway, and on Vancleave Entry near the head is bad, and should be well timbered.

Drainage—The drainage is good.

No. 415.

BASKETT MINE.

No. 415 (W. U. G.) FRANKFORT, November 25, 1893.

To Mr. C. L. Nall,
President Baskett Coal Co.,
Baskett, Ky.

DEAR SIR: You are hereby respectfully notified that on November 15th, the date of inspection, an examination of your mine, the Baskett, showed it to be in defective condition, as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The air is "split" at the bottom of the air shaft; 13,295 cubic feet per minute goes to the north, and 18,576 cubic feet per minute to the south side of the mine. With this volume of air well conducted through the mine, the ventilation would be excellent, but this is not the case. The curtains throughout the mine are so tattered that they fail to control the air at all. They must be put in order, or replaced by new ones. There should be a door across the mouth of 1st Right Cut-off where an old curtain now hangs. There is a loss of 4,020 cubic feet of air per minute through this curtain.

Props should be kept closer up to the faces of working rooms throughout the mine.

There are no safety-catches on the cages used for lowering and hoisting persons, and no safety-gate at the top of the shaft. These things must be provided.

The mine is very well drained.

No. 416.

CORYDON MINE.

No. 416 (W. U. G.) FRANKFORT, November 25, 1893.

To Mr. B. M. Powell,
Superintendent Corydon Coal Co.,
Corydon, Ky.

DEAR SIR: You are hereby respectfully notified that on November 16th, the date of inspection, an examination of your mine, the Corydon, showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

With 10 men employed inside, there is, entering the mine, 1,419 cubic feet of air per minute. This is enough, and it is well distributed.

The timbering is in fair condition.

The drainage is good.

The inclosure around the top of the shaft is too open. It should be made closer.

No. 417.

DAVIDSON'S MINE.

No. 417 (W. U. G.) FRANKFORT, November 25, 1893.

To Mr. B. C. Davidson,
Uniontown, Ky.

DEAR SIR: You are hereby respectfully notified that on November 16th, the date of inspection, an examination of your mine, the Davidson, showed it to be in a defective condition, as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

There is passing into the mine 4,620 cubic feet of air per minute, and there are 11 men employed under ground.

The volume of air is sufficient, but it is not conducted to the working places as it should be.

The 1st Cross Entry to the right is abandoned. It should be bratticed.

The rooms turned to the right of Main air-course are far ahead of the air. Curtains must be so hung across the air-course as to send the air into the rooms, and all break-throughs from room to room, except the last ones, must be closed.

The mine is not timbered at all. It is dangerous to trust so much to the strength of the roof.

The drainage is very good.

No. 418.

ECHOLS MINE.

No. 418 (W. U. G.) FRANKFORT, November 27, 1893.

To C. W. Taylor, Esq.,
Sec. and Supt. McHenry Coal Co.,
McHenry, Ky.

DEAR SIR: You are hereby respectfully notified that on November 18th, the date of inspection, an examination of your mine, the Echols, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

A measurement taken on Main Entry under the last cross timber, showed 4,860 cubic feet of air per minute to be passing into the mine.

There are about 75 men employed under ground at this mine. The supply of air is insufficient. There must be "not less than one hundred cubic feet of air per minute per person employed in the mine."

See section 10 of the Mining Law.

There should be a curtain across 1st East Entry, just past the point at which it turns to the left or north, and one across the mouth of 1st room turned off South Entry.

The timbering and drainage are very good.

No. 419.

RENDER MINE.

No. 419 (W. U. G.) FRANKFORT, November 27, 1893.

To Mr. F. M. Haines,
Superintendent Central Coal and Iron Co.,
Central City, Ky.

DEAR SIR: You are hereby respectfully notified that on November 20th, the date of inspection, an examination of your mine, the Render, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

A measurement taken on Main Entry near 4th South Entry, showed 14,497 cubic feet of air per minute to be passing into the mine. This is enough, but it is not distributed as it should be.

There is passing up 4th South Entry 2,924 cubic feet of air per minute. This is the supply to about 50 men employed on

7th, 8th, 9th and 10th South Entries. This supply should be at least 5,000 cubic feet per minute. Half of the curtain at the mouth of 9th South Entry has been torn away. It should be replaced. With these defects corrected, the ventilation would be very good.

There is a piece of slate on Main Entry, near 6th South Entry, that should be taken down.

The drainage is very good.

No. 420.

WILLIAMS MINE.

No. 420 (W. U. G.) FRANKFORT, November 27, 1893.
To Hon. J. S. Williams,
President Williams Coal Co.,
McHenry, Ky.

DEAR SIR: You are hereby respectfully notified that on November 20, the date of inspection, an examination of your mine, the Williams, showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

There is entering the mine 13,804 cubic feet of air per minute, an ample supply for the men, 57 in number, employed under ground.

The air is very well conducted to the men in their working places; but there is a loss through the curtain across the passway, from Main Entry to the furnace, and the one across the mouth of 1st West Entry. This loss should be stopped. Except a little too much water near the face of Main Entry, the drainage is good.

The timbering is very good.

No. 421.

TAYLOR MINE.

No. 421 (W. U. G.) FRANKFORT, November 27, 1893.
To Taylor Coal Co.,
Beaver Dam, Ky.

DEAR SIR: You are hereby respectfully notified that on November 21st, the date of inspection, an examination of your mine, the Taylor, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

There is passing into the mine, through an air shaft north of Main Entry, 18,950 cubic feet of air per minute. By way of an air shaft south of Main Entry, there is entering 16,732 cubic feet per minute, a total of 35,682 cubic feet per minute.

With 66 miners on North side, and 53 on South side, and about 20 day hands, this supply of air is ample.

That the air may reach the men in their working places, as it should do, room No. 1 on 2d West Entry must have a breakthrough to the air course to 1st North Entry, the rear breakthroughs in rooms 19 to 23 off 1st North Entry must be closed, and a curtain must be hung across the entry between rooms 13 and 14 (13 is the 1st working room).

The mine is very well timbered and drained. The 14 rooms off right of 2d North Entry were not inspected because of "firing."

No. 422.

DOWLAIS MINE.

No. 422 (W. U. G.) FRANKFORT, December 9, 1893.

To Mr. Philip Francis,
Superintendent East Tennessee Coal Co.,
Jellico, Tenn.

DEAR SIR: You are hereby respectfully notified that on November 28, the date of inspection, an examination of your mine, the Dowlais, showed it to be in defective condition as noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the date of inspection.

SPECIFICATIONS.

Opening No. 1—There is passing into this mine by way of the Grubbs Entry 6,578 cubic feet of air per minute. With 62 men employed under ground, this supply of air will answer, if well conducted to the working faces.

On 7th and 8th Left Entries all break-throughs to their air-courses, except the last one on each entry, must be bratticed. Rooms turned off 8th Left Entry to the left are more than 60 feet in; curtains must be hung across the entry so as to send the air through the rooms, and the rooms must be connected one with another by break-throughs, that the air may pass through them. There are 9 men on the 9th Entry and 24 on the 10th, with very little ventilation, not enough for the men employed; more must be sent to these entries.

Opening No. 2—The Main Entry is the intake here, and there is passing in 18,572 cubic feet of air per minute, an ample supply for the 38 miners and day hands employed here. This opening is very well ventilated at the working faces.

Opening No. 3, the new mine—With 30 men employed in this mine, it is being worked without having provided any artificial means of producing ventilation, in violation of section 10 of the Mining Law.

You are hereby notified to provide and maintain for this mine such ventilation as is required by law, and especial attention is called to the provision that "no working place shall be driven more than 60 feet in advance of a break-through or air-way." See section above referred to. Throughout these mines but little timbering has been done on the entries, though the roof seems to stand well and to be safe. The rooms are very well timbered. The drainage is good.

No. 423.

KENSEE MINE.

No. 423 (W. U. G.) FRANKFORT, December 9, 1893.

To Mr. Hywel Daviess,
General Manager Main Jellico Mountain Coal Co.,
Kensee, Ky.

DEAR SIR: You are hereby respectfully notified that on November 29th, the date of inspection, an examination of your mine, the Kensee, showed it to be in the condition noted below.

Statements herein are framed as if made on the day of inspection.

This inspection extended through, and this notice covers, the new and the Grape Vine openings.

There is entering the new mine 1,512 cubic feet of air per minute, which is the supply to the men in new and Grape Vine openings, 13 in number. The supply is sufficient. In the new opening, the Main Entry is ahead of its air-course, which, however, is being rapidly brought up, work going both ways. It should be kept up.

With the above exception, the ventilation in both openings is good.

The drainage and timbering are fairly good.

No. 424.

PROCTER (GRINSTEAD) MINE.

No. 424 (W. U. G.) FRANKFORT, December 13, 1893.

To Mr. W. T. Lewis,
General Manager Procter Coal Co.,
Red Ash, Ky.

DEAR SIR: You are hereby respectfully notified that on November 30th, the date of inspection, an examination of your mine, the Procter [Grinstead], showed it to be in the condition, noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

This inspection extended through, and this notice covers, the four new openings.

Openings No. 1 Right and No. 1 Left—With 13 and 8 men, respectively, employed under ground, are without any artificial means of producing ventilation. It is a flagrant violation of the Mining Law to employ this number of men under such conditions.

You are hereby notified to supply the men employed in the opening above referred to with such ventilation as is provided
tion 10 of the Mining Law; and your attention is es-

pecially called to that clause in said section which provides that "no working place shall be driven more than sixty feet in advance of a break-through or air-way."

Opening No. 2 Right—There are 12 men employed here, and there is entering this opening 3,323 cubic feet of air per minute. This is ample.

Opening No. 2 Left—With 20 men employed inside, has a supply of 3,744 cubic feet of air per minute. This also is ample.

I note your statement that it is intended to drive an entry from No. 1 to No. 2 Right, and another from No. 1 to No. 2 Left; thus establishing two systems of ventilation for the four openings. This should be done at once.

The drainage is very good, except in 4th room to the right on 1st Right Entry in No. 1 Right opening, and in last room turned off Main Entry in No. 1 Left opening. In these two rooms there is too much water for working places.

The timbering is good.

No. 425.

JELLICO-BIRDEYE.

No. 425 (W. U. G.) FRANKFORT, December 14, 1893.

To Mr. B. R. Hutchcraft,
General Manager Jellico and Birdeye Coal Co.,
Halsey, Ky.

DEAR SIR: You are hereby respectfully notified that on December 1st, the date of inspection, an examination of your mine, the Jellico-Birdeye, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

SPECIFICATIONS.

The Vanderpool or No. 2 Opening—There are but 6 miners and 1 day-hand employed under ground here, and the work has not progressed far. Still the provisions of Section 10 of the Mining Law touching ventilation by artificial means must be complied with.

Opening No. 3—With 40 men employed under ground there is entering this mine, by way of the 1st Left Entry, 3,176 cubic feet of air per minute. This is not enough, there should be at least 100 cubic feet per minute per person employed under ground. The door at the mouth of Main Entry should be made closer, and the furnace power increased $\frac{1}{3}$ or more.

The air that enters the mine is very well conducted until it reaches the gob work along Main Entry, through which much of it escapes to the furnace, and the working places beyond are left with very little ventilation. This gob work should be made as nearly air-tight as possible, or else the air-courses so driven as to conduct the air around and beyond it. Mr. Gorman states that the latter plan is intended. It is the better plan. There are other minor defects in the ventilation which it is believed will be remedied by a compliance with the above suggestions. The drainage and timbering are reasonably good. There was not sufficient time before the departure of the train to inspect opening No. 1.

Statement by Mr. Gorman that no change has been made in the conditions in this opening since the last inspection except that 14 rooms have been turned off Gob Entry.

No. 426.

CENTRAL JELLICO MINE.

No. 426 (W. U. G.) FRANKFORT, December 14, 1893.

To Mr. John Phillips,
Superintendent Central Jellico Coal Co.,
Pleasant View, Ky.

DEAR SIR: You are hereby respectfully notified that on December 2d, the date of inspection, an examination of your mine, the Central Jellico, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

On the 29th day of July, 1893, this mine was inspected by Mr. C. J. Norwood, Chief Inspector of Mines; afterwards, on the 12th day of August, 1893, a notice was sent to you by registered letter, for which you receipted on the 18th day of August, 1893.

I quote the following from said notice: "The air is not sent through the rooms on both sides of the entries, as the provisions of the law make necessary; but is sent only through those on the right, and then only through the break-throughs that cut the pillars at the neck of the rooms. The air must be sent through the rooms on both sides of the entries, as they reach the 60-foot limit, and it must be kept up to within 60 feet or less of all working faces—both entries and rooms."

You have failed to comply with the above directions, for which you are now subject to indictment. See section 3 of the Mining Law, a copy of which is inclosed herewith.

Your furnace power should be increased by the erection of a stack over the shaft.

Room 28 turned to the left off Main Entry in No. 15 opening has a bad roof near the face. It must be well propped.

You are again notified to send air through your mine, as directed in notice above referred to.

No. 427.

BRECKENRIDGE-PINEVILLE CANNEL.

No. 427 (W. U. G.) FRANKFORT, December 14, 1893.

To Mr. Geo. Bentley,
Gen. Man. Breckenridge and Pineville Syndicate, L'd't.
Pineville, Ky.

DEAR SIR: You are hereby respectfully notified that on December 4th, the date of inspection, an examination of your cannel mine at Pineville, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

There are three drifts constituting this bank. Nos. 2 and 3 are connected by an entry, and are ventilated by means of one furnace; No. 4 has no artificial ventilation.

Your furnace has a draft of 19,152 cubic feet of air per minute, which is enough for the number of men employed under ground at this bank, but the air is not so controlled as to reach the men in their working-places as it should do.

That part of drift No. 2, which is beyond the entry leading to drift No. 3, is ahead of the air and without any ventilation. There are 8 men working here. Air must be sent to them.

The rooms turned off Main Entry and air-way have been driven more than 60 feet. They must be connected, one with another, by break-throughs near the face of rooms, and the air must be sent through them.

Drift No. 3—The Main Entry, and all rooms beyond the 1st Cross-entry, are ahead of the air. The air must be brought up and carried through the rooms and kept within 60 feet or less of all working faces. This rule must be observed throughout the bank. See Section 10 of the Mining Law.

Drift No. 4—Must be provided with proper ventilation, as is demanded by law. See section just referred to.

Except at the mouth of entries, no timbering has been done upon them, but the roof seems safe. The rooms are very well timbered.

The drainage is good.

No. 428.

MARY HULL MINE.

No. 428 (W. U. G.) FRANKFORT, December 14, 1893.

To Mr. H. C. Thompson,
Lessee Mary Hull Coal Mine.
Altamont, Ky.*

DEAR SIR: You are hereby respectfully notified that on December 5, the date of inspection, an examination of your mine, the Mary Hull, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

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* This mine is in Bell county. about 12 miles southwestwardly from Pineville.—C. J. N.

There are about 20 men employed under ground at this mine. An air-shaft has been sunk; but no furnace, fan, or other means of producing artificial ventilation, has been provided, as is demanded by law, and the air at the inner working places is bad. Your attention is called to section 10 of the Mining Law, a copy of which is herewith inclosed. Notice is hereby given that this mine must be provided with artificial means of producing and maintaining an amount of ventilation of not less than 100 cubic feet of air per minute per person employed in the mine; and that no working place shall be driven more than 60 feet in advance of a break-through or air way; and that the air must be conducted by the use of brattices, trap-doors or otherwise, to the interior of the excavations, where the persons employed in the mine are at work.

No. 429.

NORTH JELLICO.

No. 429 (W. U. G.) FRANKFORT, December 15, 1893.

To Mr. C. S. Nield,
General Manager North Jellico Coal Co.,
Gray's, Ky.

DEAR SIR: You are hereby respectfully notified that on December 6, the date of inspection, an examination of your mine, the North Jellico, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

SPECIFICATIONS.

This mine has sufficient furnace power to secure ample ventilation, but not enough attention is given to the air-ways; and the air that enters the mine is not so controlled as to procure good ventilation in the rooms and at the face of entries. There is a shaft at the head of 1st Right off 5th Main Entry, which is the intake through which 2d Right and Left Entries off 5th Main are supplied; at the bottom of this shaft a number of props have been stacked; they obstruct the air; the air-way here and elsewhere should be kept clear of all obstructions. Commencing with room 21 on 1st Right of 5th Main Entry there are 5 rooms turned to the right and 6 to the left, which are in more than 60 feet; they must be connected, one with another, by break-throughs and the air sent through them; the air now is passing on the entry and in the air-way.

The 2d Right and Left Entries off 5th Main are ahead of the air; it must be brought up.

There are 27 men employed in rooms on 2d Left off 4th Main Entry; there is very little air going to them, not enough to give a reading; more must be sent here. On the 3d and 4th Left off same Main Entry there are 26 and 22 men respectively employed; they are in very bad air. These parts of the mine must have better ventilation. This can be gotten by confining the air to the air-courses until it reaches the rooms in which it is wanted. Now it is allowed to travel too much through old rooms, through which it escapes to the entries, thence to the furnace before reaching the men.

Throughout the mine rooms are driven 200 feet with break-throughs 100 feet apart, where there are any. This is a violation of the Mining Law.

See section 10, which provides that "no working place shall be driven more than sixty feet in advance of a break-through or air-way; and all break-throughs or air-ways, except those last made near the working face of the mine, shall be closed up and made air-tight by brattice trap-doors or otherwise, so that the currents of air in circulation in the mine may sweep to the interior of the excavations where the persons employed in the mine are at work." You are hereby notified to observe this provision of the law in all rooms and entries throughout this mine.

Touching the timbering and drainage, I find nothing of which to complain.

No. 430.

STRUNK'S LANE MINE.

No. 430 (W. U. G.) FRANKFORT, January 10, 1894.

To Pine Knot Coal Co.,
Strunk's Lane, Ky.

DEAR SIR: You are hereby respectfully notified that on December 18, 1893, the date of inspection, an examination of your mine, the Strunk's Lane, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The fan has capacity to supply an abundance of ventilation, but the conditions in the mine are such that the air from the fan fails to reach some of the working places.

There are heavy leaks through the closed break-throughs from the air-course parallel with Main Entry. These leaks should be stopped.

The 1st Right Entry is 75 feet ahead of the air. No working-place should be more than 60 feet in advance of the air. See Section 10 of the Mining Law.

The air passes up the 2d Right Entry turned off the 1st Cross-entry, and back through rooms to the left, missing the rooms to the right. Curtains or doors should be so placed on this entry as to send the air through the rooms to the right.

The timbering and drainage are reasonably good.

No. 431.

BRYANT BROTHERS' MINE.

No. 431 (W. U. G.) FRANKFORT, January 10, 1894.

To Bryant Brothers,
Pine Knot, Ky.

DEAR SIR: You are hereby respectfully notified that on December 20, 1893, the date of inspection, an examination of your mine, the Drift No. 1, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The ventilation is bad. Away from Main Entry it is very bad.

No artificial means of producing ventilation has been provided. This is a violation of the Mining Law, a copy of which is herewith inclosed. Your attention is called to Section 10 of the Mining Law, and you are hereby notified to provide your mine with such means of producing ventilation as is required by said section.

The 1st Left Entry should have better drainage.

The timbering is fairly good.

No. 432.

GREENWOOD MINE.

No. 432 (W. U. G.) FRANKFORT, January 10, 1894.

To Greenwood Coal Co. Lessees,
Greenwood, Ky.

DEAR SIR: You are hereby respectfully notified that on December 21, 1893, the date of inspection, an examination of your mine, the Greenwood, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

The mine is without artificial means of producing ventilation.

There are two air shafts, and two or more entries driven through to daylight, so that the conditions for natural ventilation are excellent. At the time of this inspection the air was good. Still the absence of artificial means of producing ventilation is a violation of the Mining Law. See Section 10.

The drainage and timbering is good.

No. 433.

ALPINE MINE.

No. 433 (W. U. G.) **FRANKFORT, January 10, 1894.**

To Messrs. Howard & Bruner,
Lessees Alpine Coal Mines,
Alpine, Ky.

DEAR SIR: You are hereby respectfully notified that on Debember 22, 1893, the date of inspection, an examination of your mine, the Alpine, showed it to be in the condition noted below, in violation of the Mining Law, a copy of which has been furnished you.

Statements herein are framed as if made on the day of inspection.

You have provided no artificial means for the ventilation of this mine, but depend entirely upon natural ventilation.

The frequent openings to "day-light" render the conditions for natural ventilation good. It is, however, a violation of the Mining Law to operate this mine without such artificial means of producing ventilation as is required by section 10 of the Mining Law.

The drainage and timbering are good.

XIII.

THE MINING LAW.

AN ACT to provide for and regulate the ventilation of coal mines in this State, and for the better protection of miners, enacted by the General Assembly of 1891-'93.

Be it enacted by the General Assembly of the Commonwealth of Kentucky: § 1. That there shall be appointed by the Governor, with the advice and consent of the Senate, an Inspector of Mines, who shall hold his office for four years, and until his successor is appointed and qualified; but he shall be liable to be removed by the Governor for willful neglect of duty or malfeasance in office. Any vacancy in the office of Inspector which may occur when the Senate is not in session shall be filled by appointment of the Governor till the close of the next session of the Senate. Said Inspector shall have a practical knowledge of chemistry, geology and mineralogy, and shall also possess a practical knowledge of the different systems of work ingand ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of the mines, especially fire-damp, and he shall also have a practical knowledge of mining and engineering; and said Inspector shall, before he enters upon the discharge of his official duties, be sworn to discharge them faithfully and impartially, which oath shall be subscribed on his commission, and certified by the officer administering it, and his commission so indorsed shall be filed with the Secretary of State in his office; and said Inspector shall give bond in the penal sum of five thousand dollars, with surety, to be approved by the Governor, for the faithful discharge of his official duties.

§ 2. Said Inspector shall give his entire time and attention to the discharge of the duties of his office, and it shall be a part of his duty to visit and inspect, as often as may be necessary, all the coal mines in actual operation in Kentucky, and to see that the provisions of this act are complied with by the owners, agents and superintendents of all the mines in this State.

§ 3. Said Inspector shall have power to visit and inspect any mine to which this act applies. He shall examine into the condition of such mine with respect to ventilation, drainage, timbering and general security; and if, upon inspection, he finds that such ventilation, drainage or timbering as the health or safety of the persons employed in the mine would require has not been provided, or should he find the mine insecure in any part, or should he find that sufficient and safe means of ingress and egress have not been provided, said Inspector shall at once notify the agent, superintendent or owner of the mine as to the unsafe or unwholesome condition of such mine, and require him to put the mine in a safe and wholesome condition, and such mine shall forthwith be rendered safe and healthful. For a failure to comply with the directions of the Inspector to render such mine safe, and to provide such ventilation as is sought to be secured by this law, and to provide safe and suitable means of ingress and egress, within sixty days from the date of the inspection, the agent or superintendent and owner shall be liable to a fine of fifty dollars per day for every day that such mine shall be suffered to remain in such unsafe or unhealthful condition, after the expiration of the sixty days above provided in which the required improvements should be made, which fine may be collected by indictment by the grand jury of the county in which such mine is situate; but in cases in which the Inspector is satisfied, from personal investigation, that, even if due diligence is observed, the required improvements can not be completed within the sixty days above provided, he shall have authority to extend the time for not more than sixty days longer; but when the time is thus extended, the agent, superintendent or owner who is delinquent after the expiration of the additional time, shall be subject to indictment and fine as above provided; and as a cumulative remedy, in case of failure of any owner, agent or superintendent to conform to the provisions of this law, after notice from the Inspector, within the time provided by this section, any circuit court, or the judge in vacation, may, on application of the Inspector, by civil action, in the name of the State, enjoin or restrain, by writ of injunction, the said owner, agent or superintendent from working or operating such mine with more than five persons until it is made to conform with the provisions of this law. But before such writ of injunction shall issue, the owner, agent or superintendent shall have at least three days' notice of such contemplated action, and shall have the right to appear before said court, or the judge in vacation, to whom the application is made, who shall hear the same on affidavits, and such other testimony as may be offered in support as well as in opposition thereto. It shall be the duty of the Commonwealth's Attorney of the district, and of the county attorney of the county in which the venue lies, to prepare and prosecute proceedings upon said application.

§ 4. The Inspector of Mines shall keep an office in the State House at Frankfort. He shall be provided with all necessary stationery, to be supplied by or through the State Librarian, as other officers are supplied, and he shall keep a record of all the inspections made by him, and shall furnish a certified copy of his report of the inspection of any mine inspected by him to the Commonwealth's Attorney of the district in which the mine is situated, on application therefor, which copy shall be admissible in evidence in any court in this Commonwealth, and shall be *prima facie* evidence of the truth of recitals therein contained.

§ 5. Such Inspector, while in office, shall not act as agent, or as a manager or mining engineer for, or be interested in operating any mine, and he shall annually, on or before the tenth day of February, make report to the Governor of his proceedings for and during the calendar year ending on the thirty-first day of December, and of the condition and operation of the coal mines in this State, enumerating all accidents which shall have occurred in or about the same, and giving such other information as he may deem useful, and making such suggestions as he may deem important as to further legislation on the subject of mining. The Inspector shall also report the number of persons employed in and about the mines, and the amount of coal mined; and, for the purpose of enabling him to make such report as is required by this section, the owner, lessee, agent or superintendent of every mine to which this law applies is hereby required to give, each month, accurate information, on blanks to be furnished by the Inspector, as to all accidents occurring in and about the mines, the number of persons employed, and the amount of coal mined, during the preceding month; and the owner, lessee or superintendent, refusing or failing to furnish the Inspector such information for sixty days after application therefor has been received, shall be liable to a fine of fifty dollars, to be recovered in the county in which the mine concerning which such information is refused is situate. The Inspector is authorized to extend his observations, so as to be prepared to report upon the mining possibilities and mineral resources of the counties to which he is called in the prosecution of his duties as Inspector. One thousand copies of the Inspector's annual report shall be printed for general distribution.

§ 6. The Inspector shall receive an annual salary of eighteen hundred dollars, payable monthly, and shall likewise be allowed and paid his necessary traveling expenses when absent from his office on business connected with his department; and he shall keep on file in his office maps and plans of all coal mines in operation in this State, which maps, plans, and all the books, records, and apparatus of his office, he shall carefully keep, and turn over the same, with all official correspondence pertaining to his office, to his successor; and upon application of the owner, agent, lessee or superintendent therefor, he shall make out a duplicate of any map on file in his office of any mine owned or operated by the owner, agent, lessee or superintendent making such application, for the making of which duplicate a fee of five dollars must be paid, and which fee shall, within thirty days after its reception, be paid into the State Treasury by the Inspector receiving it.

§ 7. There shall be provided for said Inspector all instruments and chemical tests necessary for the discharge of his duties under this law, which shall be paid for on the order of the Inspector, and which shall belong to the State.

§ 8. The owner, agent, lessee or superintendent of every coal mine in this State, to which this law applies, shall annually, within sixty (60) days after the first day of January, make, or cause to be made, an accurate map or plan of the workings of such mine, on a scale of not more than one hundred feet to the inch, showing the area mined, and the form of the excavations up to the said first day of January, together with the location and connection with such excavations of the lines of all adjoining lands, and the name or names of each owner or owners, so far as known, marked on each tract; a true copy of which map the said owner, agent, lessee or superintendent shall deposit with the Inspector of Mines within seventy days after said first day of January, and another copy of which shall be kept at the office of such mine. But, after the making and filing with said Inspector of the first map of the mine, as required herein, the owner, agent, lessee or superintendent shall only be required to annually make and file with said Inspector, within the times herein specified, such additional map and statement as may be necessary to truly show the progress of the workings and the amount of excavation of said mine from the date of the preceding map or survey up to the first day of January, as provided herein. The Inspector shall annually, on or before the first day of January, give warning notice that said map is required; and upon the refusal or failure of the agent, owner, lessee or superintendent receiving such notice, to make, or cause to be made, such map within the sixty (60) days, and deposit the same with the Inspector within the seventy (70) days specified herein, said owner, agent, lessee or superintendent shall be liable to a fine of five dollars ($5.00) a day for each day elapsing until said map is made, said fine to be recovered in the county in which the mine to be mapped is situated. The correctness of each map provided for by this section shall be certified to by the person making such map; and the Inspector may reject any map as incomplete, the accuracy of which is not so attested.

§ 9. It shall not be lawful for the owner, agent or superintendent of any coal mine, worked by a shaft, slope or drift, wherein fifteen thousand square yards have been excavated, to employ more than ten persons to work therein, or to permit more than ten persons to work in such mine, unless there are to every seam of coal worked in each mine at least two separate outlets, separated by natural strata of not less than one hundred feet in breadth, by which shafts or outlets distinct means of ingress and egress are always available to the persons employed in such mines; but it shall not be necessary for the two outlets to belong to the same mine; and every shaft opened after the passage of this act shall have two such separate outlets, after fifteen thousand square yards shall have been excavated; and to all other mines, whether slopes or drifts, two such openings or outlets shall be provided within twelve months after the passage of this law, provided fifteen thousand square yards have been excavated at or before the passage of this law, or if not, then within twelve months after that extent has been excavated.

In case any coal mine has but one shaft, slope or drift for the ingress or egress of the men working therein, and the owner thereof does not own suitable ground for another opening, such owner may select appropriate associate adjacent surface ground for that purpose, and have the same condemned, and appropriate the same by proceedings in the county court of the county where the mine is situated, similar to proceedings now allowed by law for securing a private passway.

§ 10. The owner, agent or lessee of every coal mine, whether slope, shaft or drift, to which this act applies, shall provide and maintain for every such mine an amount of ventilation of not less than one hundred cubic feet of air per minute per person employed in such mine, which shall be circulated and distributed throughout the mine in such a manner as to dilute, render harmless, and expel the poisonous and noxious gases from each and every working place in the mine, and no working place shall be driven more than sixty feet in advance of a break-through or air-way; and all break-throughs or air-ways, except those last made near the working-face of the mine, shall be closed up and made air-tight by brattice, trap-doors or otherwise, so that the currents of air in circulation in the mine may sweep to the interior of the excavations where the persons employed in the mines are at work; and all mines governed by this statute shall be provided with artificial means of producing ventilation, such as suction or forcing fans, exhaust steam, furnaces, or other contrivances, of such capacity and power as to produce and maintain an abundant supply of air. All mines generating fire-damp shall be kept free from standing gas, and every working place shall be carefully examined every morning with a safety-lamp, by a competent person or persons, before any of the workmen are allowed to enter the mine. And at every mine operated by a shaft there shall be provided an approved safety-catch, and a sufficient cover overhead, on all cages used for lowering and hoisting persons, and at the top of every shaft a safety-gate shall be provided, and an adequate brake shall be attached to every drum or machine used in lowering or raising persons in all shafts and slopes.

§ 11. Any person employed in any mine governed by this statute who intentionally or willfully neglects or refuses to securely prop the roof of any working place under his control, or neglects or refuses to obey any order given by the superintendent of the mine in relation to the security of that part of the bank where he is at work, and whoever knowingly and willfully does any act endangering the lives or health of the persons employed in a mine, or the security of the mine or machinery, shall be liable to a fine of not less than ten dollars nor more than fifty dollars, to be recovered in the county in which the mine is situate.

§ 12. Coal mines in which not more than five persons are employed at one time shall be exempt from the provisions of this law.

§ 13. On account of the emergency hereby declared to exist, in that it is necessary for the employes in mines to receive the protection of the provisions of this law in timely season, this law shall be in force from its approval by the Governor.

Approved February 15, 1893.